UNDERSTANDING THE GENERATION OF RESEARCH AND INNOVATION POLICY ADVICE WITH FORESIGHT PROCESSES

A thesis submitted to the University of Manchester for the degree of PhD
in the Faculty of Humanities

2017

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LIST OF ABBREVIATIONS AND ACRONYMS

ADA: Advice Discourse Analysis
CDA: Critical Discourse Analysis
COST: Cooperation in Science and Technology
CREST: Committee for Scientific and Technical Research
CRF: Copenhagen Research Forum
EARTO: European Association of Research and Technology Organisations
EC: European Commission
ECC: European Economic Community
ECSC: Treaty of European Coal and Steel Community
EFMN: European Foresight Monitoring Network
EFP: European Foresight Platform
EMN: ERA Monitoring mechanism
ERA: European Research Area
ERAC: European Research Area Committee
ESF: European Science Foundation
ESPRIT: European Strategic Programme for R&D in Information Technology
EUA: European Universities Association
FP7: Seventh Framework Programme
H2020: Horizon 2020
JRC: Joint Research Centre
LERU: League of European Research Universities
R&D: Research and Development
R&I: Research and Innovation
RIS3: National/Regional Research and Innovation Strategies for Smart Specialisation
RRR: Reposition, Representation, Resolution factors
RTDI: Research, Technology, Development and Innovation
RTO: Research and Technology Organisation
SE: Science Europe
SHO: ERA stakeholders’ platform
SME: Small and medium-sized enterprises
STI: Science, Technology and Innovation
SSH: Social Sciences and Humanities
V2020: Visions for Horizon 2020
VERA: Forward Visions on the European Research Area
ABSTRACT

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UNDERSTANDING THE GENERATION OF RESEARCH AND INNOVATION
POLICY ADVICE WITH FORESIGHT PROCESSES

The study of foresight methodology has traditionally focused on the anticipation and development of future scenarios. It is somewhat surprising that, despite the impact that the advice generated with foresight may have had on Research and Innovation (R&I) policy action, the analysis of the process whereby foresight actually creates policy recommendations has so far been ignored in the literature.

This thesis explores this process, trying to identify those elements that have a greater influence in the final advice characteristics.

The research draws on the study of two European cases, which are analysed with very different methods. The first case is addressed with critical discourse analysis, which constitutes a methodological innovation in the area of foresight evaluation. The second case is explored through action research, which facilitated an in-depth examination of the foresight process and an exhaustive tracking of the activities that gave rise to the final recommendations. In both cases special attention is paid to the role and utility of future anticipation.

The combination of these methods helped in understanding: the effect that repositioning advisors’ mindsets in highly transformed futures has in the volume and originality of the insights generated, the importance of achieving a balanced representation of the R&I actors in the discussion groups, and the relevance that argumentation has in the formation of final advice.

Understanding these factors would contribute to improve the quality and consistency of foresight advice discourses, thus augmenting their possibilities for acceptance and implementation by policy makers.
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ACKNOWLEDGEMENTS

I am eternally grateful to my parents, Elvira and Félix, for instilling in me, so discreetly and tactfully, a real culture of effort and courage. Without these values this research would not have been possible. I hope that this thesis, which symbolises the infinite love I feel for them, will make them happy, wherever they are.

Words are not enough to thank all those who stayed close to me in the good and bad times.
To my parents and brothers
1. INTRODUCTION

In Europe, the use of strategic intelligence instruments in the formulation of Research and Innovation policies has grown in parallel to the interest of governments in fostering participatory policy making. By promoting public participation and transparency in policy decisions, governments seek to reinforce some basic principles of good governance, thus legitimating policy action (European Commission, 2001).

Public consultations, citizens’ panels and stakeholders’ groups are examples of participatory activities increasingly used for supporting such policy making processes. These instruments sometimes look to the past and evaluate past policy actions to critically extract lessons for the future, whilst on other occasions look to the future to support the generation of practical ideas and devise possible solutions to issues in the present. Foresight is the most representative example of the latter, as it relies on plausible visions and future scenarios to collectively generate policy advice.

The foresight orientation towards policy action makes this instrument a powerful tool of intelligence. Since it may be eventually utilised to place actors’ specific agendas in the policy arena, conceiving policy advice with foresight is a sensitive task that requires a scrupulous design and a solid methodology.

Foresight methodology has been widely studied within the literature. However, studies have been usually focused on the anticipation of future scenarios, somehow obviating the analysis of the process followed to generate recommendations drawing on these scenarios. Probably this analysis has not been sufficiently addressed because, regardless of the process utilised to produce advice, final decisions to implement recommendations frequently depend on a variety of unavoidable and uncontrollable external (often political) influences. In fact, there is a long and complex road that goes from the formulation of advice (with foresight or other methods) to its eventual acceptance.

Although this thesis acknowledges such influences, it also assumes that identifying the factors that affect the construction of policy advice with foresight could nonetheless contribute to the generation of sounder recommendations, thus increasing the possibilities of their eventual implementation.

The research is grounded in the broadly recognised definition of fully-fledged foresight (Miles, 2005, 2008; Miles & Keenan, 2002). Miles’ definition assumes that three elements - prospective, participatory and policy-making dimensions - are present in foresight processes. The first dimension of fully-fledged foresight refers to the exploration of plausible futures and the systematic utilisation of long-term oriented methods. This is a prospective orientation that makes possible the definition of priorities, the identification of opportunities and the elaboration or adjustment of strategies.

The second dimension is related to the capacity of foresight to promote the participation and interaction of different actors. This participatory element contributes to increasing the level of
knowledge available in the discussions, while making the policy decisions emerging from the foresight process more democratic.

The third dimension of fully-fledged foresight emphasises that foresight has a practical orientation. It facilitates the formulation of policies that address complex problems in contexts of uncertainty, and makes easier the coordination and strategic integration of different policy areas.

This thesis is composed of eight chapters and six annexes.

The **first chapter** introduces the context and the problem that has motivated the research work.

The **second chapter** reviews the literature. This review presents some classical theories on the field of advice and policy advice. Then some references are provided regarding the attributes and legitimacy that actors bring to participatory advising processes. Thirdly, the review presents foresight literature from three different perspectives: foresight as policy intelligence, as a source of knowledge, and as a process of collective intelligence.

The **third chapter** explains the general and specific objectives of the thesis, the research strategy, and the fundamentals of the main methodological pillars. This chapter also includes the rationales behind the selection of two case studies.

The **fourth and fifth chapters** present, respectively, a comprehensive analysis of these cases, which are approached using two different research methods: critical discourse analysis and action research.

The **sixth chapter** represents the core of this thesis, as it constitutes the research analysis and presents the principal results.

The **seventh chapter** gives a conceptualisation and explanation of fully-fledged foresight from the perspective of foresight advising.

Finally, the **eighth chapter** summarises the whole research work through three explicit conclusions, including discussions of the implications of results, their limitations, and further areas of research.
2. LITERATURE REVIEW

Foresight is a highly participative instrument of intelligence that makes use of anticipated representations of plausible futures to generate possible solutions to current policy issues. The European Commission understands foresight as a ‘systematic, participatory, future intelligence gathering and medium-to-long-term vision-building process aimed at present-day decisions and mobilising joint actions’ (EC, 2002).

The policy orientation of foresight, its participatory component, and its future-thinking dimension, constitute the three pillars to the classical concept of fully-fledged foresight (Miles, 2005, 2008; Miles & Keenan, 2002). Accordingly, and to ensure a broad and systematic understanding of the foresight recommending process, this literature review will be structured around these pillars.

The first section of this review introduces some classical references on the role of advisors, trying to conceptualise the first pillar upon the practice of policy advice and its evaluation.

The second section reviews the second pillar as the contribution of actors in participatory advice, analysing the literature on actors’ attributes, salience and legitimacy for the generation of ideas.

The third section describes the use of foresight as a future-oriented instrument for advice. As for this third pillar, firstly the practice of foresight as an instrument of policy intelligence is reviewed. Then, the practice of foresight is discussed from an epistemological perspective, including a realistic approach to the capacity of institutions to influence individuals’ choices and opinions, the role of actors’ values in foresight processes, and the utilisation of foresight to understand the complexity of society. The section also presents studies on the factors that make collective thinking processes, in particular foresight, more appropriate than individual thinking processes to address complex policy problems.

Finally, the fourth section presents a conceptual framework that encompasses the theoretical concepts previously described. The frame aims to conceptually underpin forthcoming analytical chapters and to facilitate the mobilisation of the reviewed literature throughout the research process.

2.1. Advice theory

Theories of advice giving and taking have received little attention in the literature (Bonaccio & Dalal, 2006; Harvey & Fischer, 1997; Jonas & Frey, 2003; Jungermann, 1997; Sniezek & Buckley, 1995; Yaniv & Kleinberger, 2000). The lack of a comprehensive theory of advice may be explained by the amplitude of the research questions that the practice of advising actually addresses (Bonaccio & Dalal, 2006). As a consequence, there have been very few attempts to construct a theoretical definition of ‘advice’. In general, they only develop at operational level, through empirical and experimental design (ibid.).

The term very often relates exclusively to the generation of recommendations, e.g. those actions that ‘the decision-maker ought to do’ (Harvey & Fischer, 1997). However, it is
generally accepted that the advice concept embraces a much more complex and broader space. Heath and Gonzalez (1995), for example, suggested that advice aims to assist decision-making processes thus reducing the possibility of mistake, to provide novel information, contribute to setting up ideas, increase confidence on final decisions, and, sometimes, even facilitate social support. Cross, Borgatti, and Parker (2001) also recognise the broadness of the concept - and the lack of understanding – when they point out that advice exchange processes are more than passing ‘simple answers between the parties'. For Sniezek and Buckley (1995) giving advice means to ‘formulate judgments or recommend alternatives and communicate these to the person in the role of the judge'. The term ‘judge' refers to the actor that receives the advice and is responsible for taking the decision (Harvey & Fischer, 1997; Yaniv, 2004b).

It is interesting that most studies have analysed advice taking rather than advice giving, i.e. the role of the judge has been more analysed and studied than the perspective of the advisor (Jonas & Frey, 2003).

Although a solid and generally accepted definition of advice is missing in the literature, many studies can be found that explain the reasons why decision makers solicit advice. One of these reasons is related to the fact that real decision problems are usually complex and imprecise, thus requiring interactive and cognitive processes that engage more than one individual to propose solutions (Yates et al., 1996; Zarnoth & Sniezek, 1997). In these cases, the advisor would become a ‘sounding board' who refines these solutions by covering information gaps and evaluating alternatives (Yaniv, 2004b).

Another reason for requesting advice is related to the complexity of the decision problems. Many issues belong to social structures that are not well understood by single individuals, thus decisions are often taken after consultation, i.e. decision makers need to be influenced and persuaded by others (Brehmer & Hagafors, 1986; Sniezek & Buckley, 1995).

On other occasions, advice is merely solicited in order to achieve some sort of re-affirmation or to share the responsibility for final decisions (Kennedy et al., 1997).

A very important motivation for asking advice is related to decision-makers’ personal biases. Some studies suggest that decision-makers usually tend to make choices coherent with their personal preferences (Kray, 2000; Kray & Gonzalez, 1999). Furthermore, decision-makers seem to engage more easily than advisors in biased information searches (Jonas & Frey, 2003). In this respect, it is necessary that advice provide alternatives, new frames and disconfirming information to overcome the flaws that intuitions and beliefs may transmit to the decision making process (Yaniv & Milyavsky, 2007). Yaniv (2004b) postulates that getting advice helps people to overcome these personal preferences. Advisors may offer initially overlooked alternatives and cast light on the potential consequences of actions, thus challenging decision-makers’ initial or preconceived opinions.

A classical scholar on management decision making, Hebert Simon, discussed the importance of evaluating and comparing the consequences of actions before deciding what
actions should be implemented (Simon, 1997). Simon proposed a multi-criteria model for decision making and assumed that decision makers are not guided by rational preferences but rather by a ‘bounded rationality’ (Simon, 1955, 1972) that incorporates their own values and wishes. For Simon, decision-makers need to acknowledge that they cannot adopt optimal solutions but, at most, sub-optimal or ‘satisficing’ decisions.

2.1.1. Advice-utilisation factors

The relations and influences between advisor and judge (decision-maker) very frequently refer to the concept of Judge-Advisor System (JAS). This concept - normally used in advice research - is used to explore advisors’ behaviour and judges’ reactions to different types of advice, and is frequently underpinned by empirical experiments on decision-making.

The rejection of advice is known as advice discounting. There are three dominant theories in JAS which explain why advice is discounted: differential information, anchoring, and egocentric bias (Gino & Moore, 2007).

The differential information theory is based on the fact that decision makers are usually not aware of advisors’ personal or internal reasons for providing advice, thus they are usually reluctant to fully accept it (Yaniv, 2004b).

The anchoring theory proposes that individuals are tempted to first take into account their own personal opinion before making choices, thus decision makers prefer to make use of advisors input only for modulating their initial thoughts in one direction or another (Tversky & Kahneman, 1974).

The egocentric bias explanation suggests that advice discounting occurs mainly because decision makers consider themselves professionally or intellectually superior to the advisors, thus giving more priority to their personal opinions than to external ones (Krueger, 2003).

While anchoring is basically a short-term process, egocentrism influences the decision maker’s opinion in the long-term (Harvey & Harries, 2004). The combination of anchoring and egocentric bias theories explains why decision makers are predisposed to select advice aligned to their preconceived ideas or opinions, even before receiving any recommendation (Yaniv, 2004a, Gardner & Berry, 1995; Harvey & Fischer, 1997; Yaniv & Kleinberger, 2000).

In addition to the aforementioned basic theories of advice-utilisation, the literature offers other factors that have an important influence in the acceptance or rejection of advice:

a) The characteristics of advisors and decision makers
b) Type of problem to solve
c) Type of advice
d) Solicitation of advice
e) Advice incentives

The following paragraphs describe each of these factors.
a) The Characteristics of advisors and decision makers

When the advisor is perceived as a knowledgeable person or an expert the decision makers’ personal opinions are more easily disregarded, i.e. the effect of anchoring and egocentric discounting is lower (Sniezek et al., 2004; Harvey & Fischer, 1997; Goldsmith & Fitch, 1997). Knowledgeable advisors are considered a credible source of knowledge, thus providing ‘expert power’ to the decision making process (French & Raven, 1959; Birnbaum & Stegner, 1979). Therefore, when decision makers have less knowledge than the advisor in relation to the area of analysis very limited egocentric discounting is expected (Harvey & Fischer, 1997; Sniezek et al., 2004). Yaniv (2004b) adds to this effect the difficulties non-experienced judges have in obtaining adequate information to support their own opinions.

The quality of past advice also has an influence on judges’ decisions (Redd, 2002). In fact, decision makers often look for information on the advisors’ previous work (and their advising tools) in order to anticipate the quality of their advice (Yates et al., 1996). They also appreciate advisors who utilise unique and exclusive data sources rather than advisors that have redundant information (Van Swol & Ludutsky, 2003). There is some evidence that decision makers prefer advisors who use different decision-making tools rather than advisors who use traditional instruments that could have been utilised by decision makers on their own (Kahn & Baron, 1995). Furthermore, decision makers usually place trust in older advisors, with higher education and broad life experience (Feng & Mac George, 2006).

Price and Stone (2004) observed that decision makers tend to favour overconfident advisors. As a consequence, advisors sometimes try to simulate higher confidence levels so as to influence decision makers’ final judgements (Hollenbeck et al., 1995; Sniezek & Buckley, 1995; Yates et al., 1996).

Advice utilisation or discounting also heavily depends on the decision maker’s characteristics. Scott and Bruce (1995) identified five judges’ styles, which are not mutually exclusive. Decisions in relation to advice can actually be rational, i.e. based on logical-rational evaluation of recommendations; intuitive, i.e. drawing on intuition, beliefs, and other value-laden aspects; dependent: relying on many others’ opinions about the problem to solve; spontaneous, i.e. influenced by an urgency to take a decision; and avoidant, i.e. decision maker preference to delay the decision making process.

The decision maker’s competence also needs to be considered in the analysis of advice taking. One broadly accepted model of competence is based on the Adult Decision-Making Competence scale (Bruine de Bruin, 2007), which is based on studies of human competences by Parker and Fischhoff (2005). The model has seven decision-making competencies: a) resistance to framing, i.e. not being influenced by the way the question/problem is presented and described, b) recognising social norms, i.e. being aware of rules or standards of reciprocity with others or with society, in order to manage potential conflicts between ‘what we do’ and ‘what others think we ought to do’, c) under or overconfidence, i.e. showing coherence between our actual confidence and the level of accuracy of our
solutions, d) applying decision rules, e.g. accepting weighting-attributes or other decision procedures, e) consistency in risk perception, e.g. differentiating short term from long term risks, or, for instance, not being influenced by misleading exemplars of risk, f) path independence, i.e. disconnecting present decisions from past decisions and choices, and g) resistance to sunk costs, i.e. not being influenced by the possibility that the final decision renders previous costs or investments redundant. Strengths or incapacities in one or several of these areas effect the way advice is assimilated and utilised, and can be a way of explaining why decision makers’ sometimes make right or wrong choices.

b) Type of problem to solve

Decision makers’ reliance on advice depends on the level of difficulty of the problems they have to solve, their reliance being greater the greater the difficulty of the problem. However, when the task is simple they will take into account more their own opinions than their advisors’, regardless of the advisor’s level of expertise (Gino & Moore, 2007).

c) Type of advice

Decision makers’ reaction to advice is different according to the type of advice delivered. In fact, JAS assumes that advice is a broad concept that goes beyond a simple model of single recommendations. Dalal and Bonaccio (2010) have suggested the following types:

f) Advice in favour of a specific alternative

g) Advice against one or more alternatives

h) Information: neutral advice providing information on alternatives, thus avoiding to prioritise or favour any of them

i) Decision support: provide support and guidelines on the decision-making process

These are complemented by an additional type that represents a form of personal assistance. In fact, an advisor can provide socio-emotional support by recognising the relevance and difficulty of the problem and the decision to be taken. This support, that has been broadly analysed in the communication literature (Goldsmith, 2000; Goldsmith & Fitch, 1997; Gibbons, 2003; Heath & Gonzalez, 1995), tries to help decision-makers to diminish stress, improve their efficacy and building a feeling of belonging (Horowitz et al., 2001).

Advice for a specific alternative has the capacity of summarising the problem into a precise solution, thus enabling a faster decision making process (Schrah et al., 2006). Some authors, however, find this sort of advice negative because it may eventually limit the decision maker’s autonomy (Caplan & Samter, 1999; Goldsmith, 1994). Some authors add that the restriction of freedom can turn into reactance on the part of decision maker’s as well as loss of self-esteem (Fisher, Nadler & Whitcher-Alagna, 1982). In this sense, research into human motivation argues that, in general, people like to be the ‘origin’ of their actions, rather than just elements subject to external influences (deCharms, 1968; Deci & Ryan, 1991).

Advice against alternatives, information-oriented advice, or decision support advice give higher levels of freedom to decision makers, thus eliminating the sense of losing autonomy.
Some research experiments show that, in general, information-oriented advice is the decision makers’ most preferred type of advice (Dalal & Bonaccio, 2010). When the advisor is seen as a credible expert, decision makers may prefer to ask him/her for prescriptions, i.e. recommendations in favour of specific alternatives. Generally speaking, advice against alternatives and advice providing socio-emotional support are not among decision makers’ preferred types of advice. Heath & Gonzalez (1995) also found that information-oriented advice is actually more useful for newer rather than experienced decision makers.

Based on these findings, Dalal and Bonaccio (2010) encourage advisors to offer different types of advice according to different situations, and also try to include sufficient information on proposed alternatives.

Another typology of advice was proposed by Gibbons (2003), who actually expands the notion of advice to consider that:

j) advice can provide emotional support
k) advice can be used to endorse decision maker’s preliminary chosen alternatives
l) advice can just deliver information and arguments with which to support/ enhance the selection of preconceived decisions
m) advice can provide suggestions of alternatives not considered by the decision maker
n) advice can assist a better construction of decision maker’s self-insights
o) advice can provide assistance for a more efficient decision making process

Likewise, Cross, Borgatti, & Parker, 2001) proposed a classification of advice around five categories:

p) Solutions: the recommendations are focused on eliminating or reducing the decision maker’s problem
q) Metaknowledge: the recommendations provide the location of sources where information and knowledge can be found to solve the problem
r) Problem reformulation: the recommendations offer other alternative ways of tackling the problem, i.e. the advisor invites the decision maker to think differently
s) Validation: the advice aims to confirm the usefulness of tentative or selected actions
t) Legitimisation: the advice does not merely validate actions but is also supported by respected reviewers to endorse those actions

Cross et al. suggest that advisors deliver one of these five principal types of advice. The remaining categories are complementary and accompany the principal category.

Finally, Yaniv (2004b) has distinguished between qualitative and quantitative types of advice. Quantitative advice corresponds to recommendations or opinions based on matters of fact, i.e. estimations and forecasting-based advice. On the other hand, qualitative advice is based on matters of taste, i.e. related to personal attitudes and intuitions. He believes that taste-based advice helps decision makers to reduce doubts on their reasoning processes, such as their incapacity to produce or consider enough alternative actions and their predisposition to be anchored to their preconceived views. Yaniv et al. (2011) observed that in taste-related
problems (e.g. what restaurant to choose, or what music to listen to) the similarity between advisor and decision maker, e.g. age or personal preferences, is an important factor in predicting to what extent the advice will be accepted and utilised.

d) Solicitation of advice

The level of utilisation or acceptance of advice differs when advice is solicited or unsolicited, being more easily accepted when it has been requested (Bonaccio & Dalal, 2006, 2010). Asking for advice means that people are predisposed to consider ideas and suggestions different than their own opinions, and in principle they would be inclined to their utilisation. On the contrary, unsolicited advice is often found intrusive and can be seen as a criticism about the decision maker’s competency or autonomy (Goldsmith & Fitch, 1997; Goldsmith, 2000, Deelstra et al., 2003; Harber et al., 2005; Reinhardt et al., 2006).

e) Advice incentives

Studies made by Sniezek et al. (2004) concluded that decision makers rely more heavily on advisors motivated with economic or financial incentives (Sniezek et al. 2004). Paid advice is actually better accepted than freely delivered recommendations (Gino, 2008). This is probably due to the ‘sunk cost’ effect, i.e. the decision maker has already invested funds and time in the decision process (Arkes & Blumer, 1985; Gino, 2008). However, it is also interesting to note that decision makers sometimes feel social pressure when rejecting freely given advice, as there is a risk that, as a consequence of rejection, free advice might not be offered by the advisor again in the future (Sniezek & Buckley, 1995). Incentives certainly tend to decrease the possibilities of advice discounting (Sniezek & Van Swol, 2001; Sniezek et al., 2004) due to the fact that rewards are normally seen by decision makers as a guarantee that advisors will increase their efforts (Camerer & Hogarth, 1999)

Decision makers are also sometimes rewarded. When judges have ‘rewarding power’ on their decisions the possibility of advice discounting is reduced (Sniezek & Van Swol, 2001; Van Swol & Sniezek, 2005). The same decreasing effect happens, i.e. the possibilities of advice rejection diminish, when the decision maker pays advisors before starting the advising process (pre-paid advice) (Sniezek et al., 2004).

Finally, somehow related to several of the aforementioned factors, we will review one interesting model to explain advice utilisation proposed by Jungermann (1999). He suggested that the acceptance of advice depends on two pairs of factors.

The first pair of factors refers to the perception of expertise that decision makers have of both themselves and their advisors. The effect of this mutual perception of expertise was experimentally proven by Harvey and Fischer (1997).

The second pair of factors assumes that the acceptance of advice depends on the perceived quality of advice that both the decision makers and the advisor have. This was empirically
demonstrated by Harvey et al. (2000). Sniezek and Buckley (1995) found that when two advisors disagree on their recommendations, decision makers prefer to accept the advice given by the one that most strongly perceives his or her own recommendation as an advice of greater quality.

Interestingly, Jungermann (1999) suggested that these factors are compensatory, i.e. advice could be accepted from highly experienced advisors despite giving advice of bad quality. Conversely, decision makers could reject good advice from advisors about whom they have little confidence or trust.

2.1.2. Accuracy of advice-based decisions

The term ‘accuracy’ is associated with the correctness of supported-by-advice decisions, i.e. linked to the effectiveness of the utilised recommendations. It refers to those recommended actions whose implementation has proved useful for solving the problem addressed. It is experimentally confirmed that decision makers supported by advice actually improve the accuracy of their final decisions (Gardner & Berry, 1995; Sniezek et al., 2004; Yaniv, 2004a). Brehmer and Hagafors (1986) believe that asking advisors for assistance reduces the complexity of the problem to be solved, thus increasing the accuracy of decisions, even when the advice is not of a good quality.

The accuracy of decisions also increases when using multiple advisors, especially when they deal with multiple information sources (Yaniv, 2004a, 2004b; Gardner & Berry, 1995). There are many studies that show how averaging ideas from various persons improves the accuracy of solutions (Zarnowitz, 1984; Armstrong, 2001; Ashton & Ashton, 1985; Larrick & Soll, 2006; Libby & BlashWeld, 1978; Surowiecki, 2004; Winkler & Poses, 1993; Yaniv, 1997; Yaniv & Hogarth, 1993). This is due to the fact that decision makers have to synthesise a variety of recommendations, identify consensus, and reduce the variations between individuals’ opinions, which reduces the possibility of error (Yaniv, 2004a, 2004b). Some scholars believe that accuracy actually benefits from the integration of recommendations that come from multiple and non-correlated advisors and sources (Soll, 1999; Johnson, Budescu, & Wallsten, 2001).

It is important to add that the accuracy of decisions is also affected by the level of precision with which advice is presented. In fact, specific and precise advice, either quantitative or qualitative, generally leads to more correct decisions than ambiguous or vague recommendations (Rantilla, 2000).

2.1.3. Advice confidence

Advice confidence refers to the decision maker's feeling that the decision (inspired by the advice) is correct. In general, decision makers with high confidence and trust in their advisors tend to accept their recommendations (Sniezek & Van Swol, 2001). It is important to note, however, that the relation of confidence among advisor and decision maker is usually unbalanced, as far as only the latter has the entire responsibility of final decisions.
and their consequences. Advisors, on the other hand, need confidence or trust in the decision maker to be sure that they receive and understand the recommendation or information provided (ibid.).

The coincidence of recommendations across different advisors is a factor that tends to increase the decision maker’s confidence (Budescu et al., 2003). Interestingly, Bonaccio & Dalal (2006) also observed that the confidence on decisions rises when high intellectual efforts are necessary to comprehend and assimilate the received advice. Similarly, confidence is higher in judgements and reflexive tasks than in relatively simple choice-based decisions (Klayman et al., 1999; Soll & Klayman, 2004).

Decision makers also become confident about a specific piece of advice when, normally due to the lack of alternative advice or information, their decisions depend almost exclusively on that particular recommendation (Sniezek & Buckley, 1995).

From a different perspective, Cooper (1991) observed that less confident decision makers generally demand more advice to support their decisions than highly confident and experienced decision makers. The assistance of multiple advisors and the utilization of a great volume of information to prepare the recommendations also elevate the levels of confidence (Budescu & Rantilla, 2000; Budescu et al., 2003).

Finally, Heath & Gonzalez (1995) and Savadori et al. (2001) indicate that confidence in decisions is higher after receiving advice than before the advising process. In fact, the interaction of advisors and decision makers during the advising process may contribute to reinforce confidence and create new rationales and points of view in decision makers with which to better argue their decisions (Heath & Gonzalez, 1995; Schotter, 2003). In this sense, foresight exercises very frequently include the participation of decision makers in discussion groups.

### 2.1.4. Advice Group thinking

Most of life's big decisions are made interactively. Interaction gives people the opportunity to explain their personal choices, beliefs and ideas to others, thus increasing the confidence of their positions (Heath & Gonzalez, 1995). Group thinking provides a natural context for this interaction. It refers to those participatory and interactive processes capable of generating shared messages or collectively agreed conclusions from a set of individuals’ opinions and ideas. Drawing on seminal works on group thinking developed by social theorists (Arrow 1963; Black, 1958), during the 60s and 70s psychologists tried to build models that identify and explain those factors that help to get consensus and improve the performance of groups (Kerr & Tindale, 2004).

Laughlin (1980, 1999) suggests that group thinking is more efficient than individual thinking to solve problems because the group share a conceptual system of ideas. Tindale et al. (1996) understand these systems as 'shared task representations' which normally guide the decisions taken collectively. Other authors (Cannon-Bowers et al. 1993; Hinsz, 1995) conceive these shared representations as components of a wider ‘mental model’ also shared
by the group. Kameda et al. (2002), in relation to individuals’ preferences, point out that a ‘social sharedness’ of values and beliefs usually have an inordinate effect on the group decision. Other research works indicate that groups perform better and get more efficient solutions when its members share the same conception of the problem and have a clear idea of the roles they assume (Mathieu et al. 2000).

Sharing a conceptual system in the group is important for devising ‘demonstrably correct solutions’ of problems. The concept of ‘demonstrability’ (Laughlin & Ellis, 1986) distinguishes between intellective and judgmental tasks in group thinking decisions. Intellective tasks are those that require demonstrable solutions by the group, while ‘judgmental’ tasks refer to decisions adopted just by voting to reach a group majority or consensus (Kameda et al., 2002). Demonstrability in group thinking demands a) the predisposition of reluctant members to accept the shared solution, b) the ability and motivation of ‘correct’ members to demonstrate the appropriateness of the decision, and c) the availability of enough shared information.

The availability of information within the group has also been a matter of research discussion. Stasser & Titus (1985) studied the effect of shared information. They concluded that group decisions, in general, almost exclusively rely on shared information, in detriment to unshared information (personal opinions and experiences not openly distributed across the group). Focusing only on shared information may have negative effects on the quality of the solutions, as it hinders the debate of individuals’ original ideas and avoid the discovery of valuable ‘hidden profiles’ (Wittenbaum & Stasser, 1996). Winquist and Larson’s (1998) studies show that positive impact from unshared information discussions may be obtained by giving the group enough time for debate.

There are several aspects to be taken into account when balancing the use of shared information versus unshared information in group discussions:

u) People in group discussions prefer to deliberate on information that is shared by all the members, in particular at the beginning of discussions (Stasser & Titus 1985)

v) In situations where group members share the same information and similar preferences the pressure to quickly arrive to a solution may lead to less exchange of ideas and premature consensus (Karau & Kelly 1992, Kelly & Karau 1999, Kruglanski & Webser, 1996)

w) People are more comfortable in situations where they get and/or provide information that is already shared by others (Wittenbaum et al., 1999), as they may be perceived as better informed and more credible by the audience.

x) Allocating responsibilities for specific knowledge areas (of shared information) to different group members (guaranteeing that all members know who is specialised on each area) contributes to increase the group performance, especially in ‘hidden profiles’ circumstances.
y) Leaders and hierarchies almost inevitably emerge in discussion groups (even in intentionally undifferentiated ones) (Bonaccio & Dalal, 2006). These leaders have great influence on the way unshared information is considered and treated.

z) Group members prefer not to modify the ideas and preferences that have already formed about the discussed problems. Hidden profiles are often not well received as far as any new information could be misinterpreted and lead the group to wrong or biased conclusions (Brodbeck et al., 2002; Greitemeyer & Schulz-Hardt, 2003).

With respect to the possibility of bias, Tindale et al. (1996) suggested that group thinking processes do not necessarily attenuate individual biases but could eventually intensify them. The extent to which group decisions are influenced by individual biases depends on the type of bias, the sort of decision process, the strength/intensity of the bias, and the distribution of individual preferences within the group (Kerr et al., 1996).

Other important factor to analyse in collective thinking is the size of the discussion groups. Size needs to be simultaneously large enough to promote interaction (which is an essential element of participatory processes like foresight, for example) and sufficiently small to guarantee the controllability of the group dynamics by the facilitators or moderators. Brainstorming (Osborn, 1953, 1963) is perhaps the best known and most practical tool utilised for the generation of ideas in groups. Related to brainstorming, Isaksen and Gaulin (2005) have identified ‘social loafing’ and ‘matching of effort’ effects as two size-related barriers in the generation of ideas. ‘Social loafing’ emerges as a consequence of people feeling that their contributions have little influence in large groups, where a lot of alternatives ideas are produced, thus the individual reduces his/her productivity (Ruback, Dabbs, & Hopper, 1984). ‘Social loafing’ augments when group size increases (Karau & Williams, 1993). The ‘matching of effort’ effect is based on the fact that individuals discussing in groups normally tend to compare and equalise their performance with the others in the discussion (Paulus et al., 1999). As a result, participants that observe that other members are not contributing satisfactorily are liable to express their discontent through a lower performance (Mulvey et al., 1998). These factors, among others (such as the importance of giving voice to all the components of the group within a limited time or the necessity of promoting the interconnection of ideas across participants during the debates), help explain why discussion groups in foresight workshops are normally conceived to include between six and ten people.

In sum, the literature on group thinking shows numerous and varied conclusions. Both a strong and weak advice may be actually the result of collective thinking, regardless of the characteristics of the process (Kerr & Tindale, 2004). Hidden profiles (Wittenbaum & Stasser 1996) and ‘shared task representations’ studies (Tindale et al., 1996) demonstrate, for instance, that group-thinking can eventually produce poor advice when group members are not sufficiently integrated (Mullen et al. 1994), do not have clear leadership (Peterson et al. 1998), or if members have a sense urgency to reach an agreed solution.
2.1.5. Policy advice

Once we have introduced advice theory in general terms, the discussion will focus on policy advice. The elaboration of advice for policy decisions is actually a very particular endeavour that requires from advisors a profound understanding of policy contexts, objectives and available resources.

Lasswell’s observations on contextual understanding and developmental constructs constitute a seminal approach to the role of advisors in policy sciences (Lasswell, 1971). Advisors need to recognise when and where policy problems come from so as to predict policy paths. Lasswell’s notion of developmental constructs suggested adopting a future-oriented perspective in policy sciences, which to some extent represents an elementary version of modern foresight at that time. This policy orientation calls for thinking in terms of future-shaping rather than on prediction modalities like conventional forecasting. The notion of anticipation is actually anchored to the roots and origins of policy advice. Anticipation was already at that time associated with the concept of ‘analysis for policy’ rather than with other alternative ‘analysis of policy’ approaches (Lasswell, 1971; Gordon et al, 1977; Hogwood and Gunn, 1984).

For many authors, policy advising is an art or a craft, rather than a science (Weller and Stevens, 1998). This is based on the fact that there are practically no rules for guiding the advisors’ judgements. Policy advisors have to play the role of policy makers and, after scrutinising different policy options, decide on the most suitable policy alternatives. In this sense, MacRae and Wilde (1979) and Linder and Peters (1984) emphasise the necessity of analysing the recommendations’ consequences rather than their origins, and propose models of causation (problem definition and causes), evaluation of alternatives (ex-ante) and interventions (selection of instruments) in policy design.

Policy design (Linders and Peters, 1984, 1988, 1990; Ingraham, 1987; Alexander, 1982) and policy advice (Basu, 1997; Weller and Stevens, 1998) are frequently interchangeable concepts, both differing from experiential (or ‘learning by doing’) policy making. Policy advice includes the selection of policy options and instruments once the impact and potential implication of choices in every specific policy context is ex-ante questioned and assessed. An effective policy design allows policy analysts to deal with complexity, avoiding trial and error policy constructions (Linders and Peters, 1984), thus helping decision-makers to shed light on the chaotic ‘garbage can’ environment (Cohen et al, 1972).

Cohen’s garbage can model was used in the US to represent a process where four elements cohabit: problems, solutions, participants and choice opportunities. Looking for the convergence of these elements is part of the advisor’s responsibility (Kingdom, 1995). Expanding on from the garbage can metaphor, Kingdom conceived policy making contexts as ‘primeval soups’ where three streams - problems, policy and politics- confluence to create windows of opportunity and policy outcomes. This metaphor has also been used by Ackrill et al (2013) to explain some European policies deficiencies.
To some extent difficulties in achieving Kingdom’s three streams convergence explain why policy analysts and advisors usually find it complicated to understand and anticipate policy decisions and, in particular, why the evaluation of policy advice has been object of so few studies in the literature. One of these studies was the Australian evaluation of agencies for provision of advice, which suggested that good advice needs to be systematically obtained, well informed, analytical, effective, and delivered on time (Weller and Stevens, 1998). In the same vein, Keating (1996) argued that advisors also need to ensure that recommendations are relevant for recipients although putting a word of caution on the possibility that personal judgments could bring forward other political interests. From another point of view, Basu (1997) defined two categories of ‘bad’ policy advice, which can be either wrong, referring to those recommendations that are not actually directed to the objectives (unfocused), or futile, which means that the advice is unfeasible or self-defeating (unsound).

The difficulties that analysts find in assessing the quality of policy advice are also based on the fact that the implementation of policy advice largely depends on political interferences and policy context changes. Policy makers’ final decisions are actually sometimes radically different from initial intentions. As a consequence, the quality of advice cannot be evaluated in terms of its confirmed implementation or rejection. This would not take into account the events that actually occur during the long path between advice delivery and eventual acceptance and implementation. These circumstances often explain why some recommendations remain indefinitely in the policy maker’s ‘non-prioritised things’ agenda, whereas other recommendations unexpectedly receive high attention. To avoid this problem, advice evaluation needs to focus on the process whereby recommendations are actually developed, trying to critically challenge the proposed alternatives and their consequences. In this respect, Waller (1992) suggested that advice evaluation can be done by questioning the correctness of analysis and the accuracy of predictions, and by identifying the reasons (ex-post) of not being finally accepted and adopted. From a different perspective, an ex-ante evaluation of policy advice, i.e. evaluating advice prior to its delivery to policy makers, presents the following benefits:

- aligning recommendations with policy objectives more efficiently, thus making policy makers more confident on the use of intelligence instruments like foresight
- reducing the risk of eventually adopting inefficient or counterproductive recommendations
- minimising the possibilities of taking biased decisions or implementing pre-conceived policy agendas
- increasing the quality of advice and augmenting the possibilities of policy implementation

For Linder and Peters (1984), assessing the quality of policy advice from an ex-ante perspective would gradually contribute to transforming traditional ex-post policy analysis into a more problem-solving oriented activity that emphasises the strategic implications of actions. In fact, an ex-ante evaluation of policy advice might enable analysts to anticipate to
what extent their recommendations are convincing enough and have real options to be accepted by policy makers despite other political influences.

Overall, being aware of what elements make advice more convincing and recognising what advice features will be more intensively scrutinised by the advice receptor (or by a potential advice evaluator) would help policy advisors, and in particular foresight teams, to make their messages stronger and more persuasive.

2.2. Participatory policy-advice

For conceiving and formulating European policies, the European Commission makes intensive use of participatory processes like foresight, where a broad variety of experts and other legitimate actors and stakeholders participate.

The use of these processes to generate policy advice thus contributes to legitimate the policy action, guarantee good levels of governance, and avoid, at least theoretically, the introduction of personal agendas and preferences.

The utilisation of experts in policy advice has been frequently discussed in the literature. For Haas, the usable knowledge (or policy advice) generated by experts and epistemic communities requires the characteristics of credibility, legitimacy and saliency in order to be accepted and implemented in the policy spheres (Haas, 2004). Other authors suggest that this expert-based knowledge should meet criteria of adequacy, legitimacy, value and effectiveness (Clark & Majone, 1985).

From a constructivist perspective Haas (1992) also points out that, regardless of any achieved consensus, epistemic communities cannot provide the truth, and believes experts and academics’ opinions are also susceptible to socio-political influences.

Other perspectives refer to ‘orientational’ knowledge as a third way between pure political knowledge and the scientific understanding of policy problems (Kropp & Wagner, 2010).

This section looks at the participatory advice processes from the perspective of the actors’ representation. The first part of the section discusses the importance of participants’ attributes and the legitimacy these actors bring to the process. The second part reviews some theoretical models that reflect the importance of considering and analysing, when designing discussion panels, the role that participants actually develop within the represented system.

2.2.1. Actor’s attributes

The representation of system actors in discussion panels is a crucial aspect of participatory advising processes. The combination of participants can actually enhance or, on the contrary, overlook some actors’ attributes that, in principle, could have been interesting to have present in the discussions. Specific decisions on actors’ representation could eventually contribute to achieving group synergies.
Before studying these attributes it is important to explain why policy advice is actually carried out with the participation of so many actors:

- The first factor is explained by the fact that policy advisors usually need to adopt a long-term perspective when tackling policy formulation problems. Repositioning advisors’ mindsets on transformed future landscapes requires an exercise of abstraction that can be more effectively achieved collectively than individually.
- Secondly, collective thinking enhances the legitimacy of the advice. A smart representation of actors in advisory panels actually reinforces the peripheral route of persuasion (Petty et al, 1997). This theory associates the legitimacy and strength of messages with the actual credibility of advisors and their presumed capacity to offer solutions and consensus on complex issues. Another persuasion theory, the heuristic-systematic model, suggests that the credibility of the sources and the advice contents are the actual basis of persuasion (Chaiken, 1980).
- Thirdly, collective thinking processes bring a variety of societal actors’ concerns to the policy arena. Lasswell’s policy decision seminars (1960) form a seminal reference in this respect. Joldersma (1997) states that participatory policy processes have the faculty to put governments and non-governmental entities together to discuss complex dynamics, so they may influence decisions that are important for their interests. Another perspective is given by Linders and Peters (1990), which observe that an unjustified preference for the participation of certain institutions in policy advising or policy formulation is a symptom of wrong and unconscious policy design.

To highlight even more the importance of participation and to complement the reasons given above, the next paragraphs will review what sort of attributes participants bring to policy advising processes.

Many theories (Mitroff, 1983; Sabatier, 1988; Jobert 1989; Scharpf, 1997) accept that actors’ attributes are principally based on values, resources and perceptions (Hermans & Thissen, 2009). The notion of value refers to actors’ interests or relative preferences. Some interests could even lead to the utilisation of foresight exercises to legitimise positions previously elaborated (Miles, 2012). These interests can be better realised with appropriate resources or instruments, thus enhancing actors’ influence and power. Actors’ perceptions have a neutral nature and frequently relate to the function developed by the actor within the system. These perceptions also relate to Campbell’s notion of ‘background’ ideas, which take the form of paradigms or normative frameworks. In policy decisions, these background ideas are as important as pure rational choices and self-interest based decisions (Campbell, 2002; Yee, 1996).

From a different perspective, and also related to the manner actors generate insights and make decisions, March and Olsen (2004) distinguish between the logic of consequentiaity, associated to highly rational and logical judgements, and the logic of appropriateness, linked
to decisions made in ambiguous situations, with scarce information, and basically based on suitability and intuition.

The acceptance of one actor's attributes by other actors defines his/her level of legitimacy (Suchman, 1995; Scott, 1995). Suchman defined legitimacy as a 'generalised perception or assumption that the actions of an entity are desirable, proper or appropriate within some socially constructed system of norms, values, beliefs, and definitions'. Based on institutional sources of legitimacy, he distinguished pragmatic legitimacy (based on actor’s self-interests and preferences), moral legitimacy (social system oriented actions), and cognitive legitimacy (taken for granted intellectual and cultural assets).

In this section we have addressed the contribution of participants’ attributes to the advising process. The review was focused on the individual’s personal characteristics. However, participants’ behaviour also depends on the position they occupy in the targeted system and their relationships with other actors. The next section will present some theoretical models that help to explain actors’ behaviour from a systemic perspective.

2.2.2. Stakeholders’ salience and representation

Delimitating the composition of stakeholder representation in collective thinking processes demands a meticulous identification of actors who are relevant to the process, as well as a clear design of the dynamics guiding their participation.

A classical definition and a theory of stakeholder was proposed by Freeman (1984) in the field of business strategy, although it is to some extent also applicable to policy analysis and public institutions. For Freeman, ‘a stakeholder is any group or individual who can affect or is affected by the achievement of the organisation’s objectives’. Although different theories have been proposed after Freeman’s theory, very few frameworks have convincingly studied the behaviour of stakeholders to date. In this respect, Donaldson and Preston (1995) affirm that there is no unique stakeholder theory, but a variety of approaches to stakeholder management.

A more consistent proposal was suggested by Mitchell et al (1997) for stakeholder classification. Mitchell’s salience model, which was also initially conceived for the business sector, has had interesting applications in policy intelligence (a very relevant one can be found in the Communication Strategy of VERA project) (Haegeman et al., 2012). The stakeholder salience model offers a political, operational and dynamic approach for qualifying stakeholders, bringing about the relevance of actors’ legitimacy, power of negotiation, and urgency perception. Mitchell argues that these attributes are socially and objectively constructed. They can also fluctuate and sometimes actors are not even aware of their possession of them. As a result of these combinations of attributes, the model characterises stakeholders as dominant, discretionary, dependent, dangerous, demanding and definitive. For an explanation of legitimacy, we can refer to the previously mentioned Suchman’s definition. With respect to power, Salancik et al (1974) defined it as ‘an ability to
bring about desired outcomes’. Etzioni (1964) provided a categorisation of power - coercive, utilitarian and normative- based on the resource used to develop such power. As for urgency, Mitchell defines it as ‘the degree to which stakeholders’ claims call for immediate attention’.

Although the salience model provides insights for a stakeholder classification, the practical problem still remains of which actors should be represented in advisory panels. An important issue is, for example, to clarify to what extent the actors would be affected by the implementation of policies. Churchman (1971) underlined the importance of a systematic analysis and a boundary critique. When setting up system boundaries, and to avoid excluding some actors, not only the technical aspects but also the ethical ones need to be considered.

Churchman’s ideas were supported by Ulrich (1983) with his critical systems heuristic. The theory is based on the systems thinking philosophy. He established four boundary categories trying to explain the role of different stakeholders: the client, as a source of motivation the decision-maker who provides a control function; the expert as a source of knowledge; and the affected actors, whose legitimacy needs to be represented during the process. Interestingly, Ulrich’s categories resemble those actors taking part in foresight processes, i.e. foresight sponsors motivate the project, foresight coordinators and facilitators control the process, some participants (chosen by their cognitive legitimacy, in Suchman’s terms) provide knowledge resources, and other affected participants take part in the process due to their role or position within the system.

### 2.3. Future-based advice

The two previous sections discussed two essential aspects of foresight, i.e. the policy-advice orientation and the participatory dimension. In this section we will conceptualise the term fully-fledged foresight and its prospective (future) dimension. Understanding how advice is generated required a review of both the practical and the theoretical character of the foresight process.

The practical one is addressed in the first part of this section. It includes a conceptualisation of foresight as an instrument of policy intelligence, a description of its operationalisation, and some references to the capacity of foresight to be utilised by several disciplines and knowledge domains.

The theoretical part refers to the relatively frequent debate on whether foresight can be considered a valid source of knowledge. This controversial aspect, together with the fact that this research is grounded in a critical realism epistemological position, justifies the realist characterisation of foresight presented in this second section.

Finally, the third section has both practical and theoretical components. The rationale behind this section is that foresight advice, as a product of collective intelligence, is in practice the consequence of aggregating and synthesising the outcomes of many individuals’ thinking
processes. In this sense, the section reviews how some classical theories of human intellect explain essential functions of advice generation, paying special attention to divergent thinking and creativity.

2.3.1. Foresight as an instrument of policy intelligence

This section includes a conceptualisation of foresight, a description on its operationalisation, and a discussion on its application across disciplines.

a) Foresight conceptualisation

The initial use of futures studies for supporting strategic decisions dates from the end of the Second World War, in a context where US military planning techniques were gradually adopted by industrial and technological sectors. Futures studies were found particularly useful for technology assessment. In the 1970s, Japan adopted a stronger orientation to the definition of research priorities and to informing policy makers. In Europe, however, these initiatives developed more slowly, at best trying to reproduce Japan’s practices. In France this sort of study was mainly applied to the prospective study for organisations.

The term ‘Foresight’ specifically emerged from the Science Policy Research Unit (SPRU) at the University of Sussex (Irvine et al, 1984). SPRU’s research programme STAFF (Social and Technological Alternatives for the Future) is deemed the seminal connection of the concept with Innovation studies (Miles, 2008). In the UK, Foresight was conceived from a perspective where social networking played a prominent role to promote stakeholder’s participation, thus generating shared visions and recommendations.

As mentioned at the very beginning of this chapter, the European Commission (2002) has highlighted the systematic, participatory, long term and pragmatic character of foresight. Foresight is a policy making instrument that provides structured anticipation and examines different future alternatives (Havas, 2005). The foresight process stimulates creative thinking and fosters multi-disciplinarily approaches to make possible collective learning (Harper & Pace, 2007). In this sense, Staton (2008) suggests that the capacity to promote creative knowledge distinguishes foresight from other practices.

A critical perspective is given by Bussey (2014) who remarks the ‘ethical force’ of foresight is to make aware people of actual needs other than the ones related to the immediate present. Foresight actually anchors the future to our lives and expand our time-coordinates beyond the present. By questioning futures and peoples’ conventional assumptions about them, foresight contributes to collectively understanding plausible paths and ‘visions of change’ (Ramos, 2017).

Slaughter (1995) has shared the idea of future as a ‘principle of present action’, thus images of the future can give shape to actions in the present. Slaughter refers foresight to the individuals’ cognitive capacities, linking the discipline to the capacity of humans to recognise changes and temporality (Slaughter, 2004).
Drawing on former work with Keenan (Miles et al., 2002), Miles presented in Georghiou et al. (2008) the concept of **fully-fledged foresight**, which embraces the notion of long-term opportunities (prospective dimension), interaction-networking (participation dimension), and practical orientation (policy dimension). The concept had similarities or parallels with the ‘Greek Triangle’ (Godet, 1994, 2001), which presented a ‘strategic prospective’ based on futures (anticipation), appropriation (mobilisation and shared values) and action (planning). The difference between fully-fledged foresight and traditional futures studies is basically related to the actual linkages of foresight with the policy action, and its capacity to facilitate actors’ networking that enables knowledge sharing processes.

The **policy dimension** of fully-fledged foresight contributes to the integration of different policy actions, prioritising R&D agendas, and the creation of partnerships between public and private actors (Miles, 2008). Consequently, foresight is very frequently used as a tool for policy intelligence. In relation to its capacity for providing strategic intelligence, Kuhlmann et al. (1999) had emphasised the importance of guaranteeing the quality and reliability of foresight information and its delivered recommendations. This intelligence may be provided during the policy-design phase, i.e. informing and adopting a counselling function that combines and enriches visions with policy advice, or during the policy implementation process, i.e. facilitating the long-term policy action through learning processes and knowledge sharing (Da Costa et al., 2008; Eriksson & Weber, 2008).

The **participation dimension** tries to a) broaden the knowledge available for solving complex issues though the contribution of many individuals, b) add democratic legitimacy to decisions, and c) facilitate the absorption of discussed messages and practices within actors and their organisations (Miles, 2008). It is useful, given its social character, for strengthening the ‘participation’ principle of European good governance (EC, 2001). Foresight also promotes and strengthens networking connections between stakeholders, both during the implementation phase of the foresight program as well on the post-program period, during which solid relations can be established. This has important implications for the reinforcement of research and innovation systems. One interesting analogy between foresight and Innovation was studied by Martin (1995), who concluded that drivers of success and failure are similar both in foresight and industrial innovation processes.

The **prospective dimension** assumes the utilisation of future constructions to explore opportunities, validate strategic alternatives, or outline potential long term developments (Miles, 2008). In this respect, foresight literature emphasises that foresight does not aim to predict the future but to propose practical initiatives for customising that future according to long term goals, or to devise actions to avoid undesirable scenarios.

The European Commission has launched and financially supported several projects trying to understand the nature of these foresight dimensions, and to explore the foresight activities carried out worldwide. The European Foresight Monitoring Network (EFMN) (Popper, 2009) took over the former Mapping Foresight Competence in Europe (EUROFORE) (Keenan et
al, 2003) in order to gather foresight exercises in Europe and beyond. In addition, the European Foresight Platform (EFP) (Popper et al, 2011) included other forward-looking activities such as forecasting, horizon scanning and technology impact assessment.

b) Foresight operationalisation

In essence, foresight is composed of three activities, namely thinking on the future, debating the future and shaping the future (EC, 2002). Foresight activities were also typified by Miles (2002) around five steps: pre-foresight (designing the process), recruitment (involving and engaging people), generation (conceiving futures), action (conceiving recommendations) and renewal (transforming futures). Based on this phases, a broadly accepted conception of the foresight phases was suggested by Popper and Teichler in the first EFP Mapping Report (Popper et al, 2011). They conceived the foresight process as a sequential process of five phases: scoping, mobilising, anticipating, recommending and transforming (Popper et al, 2011).

- The **scoping phase** is the first step of every foresight project. In this phase the sponsor’s problem is assessed in relation to the characteristics of the milieu where the foresight project will be conducted. A set of variables are considered in this initial phase, e.g. objectives, sponsors, experts’ engagement, horizon time, monitoring activities, executor’s profile, stakeholders’ involvement and methods combination. This scoping process has to be flexible enough to avoid blocking situations as well as sufficiently precise to permit further foresight evaluations (Keenan & Miles, 2008).

- The second step of foresight is the mobilisation phase. Foresight needs to recruit those experts, citizens, organisations, institutions and stakeholders who can propose actions related to future alternatives. In this respect, Miles (2012) suggests a ‘dynamic foresight’, more focused on understanding the contribution of participants involved in the production of recommendations rather than on the impacts of the exercise. Piirainen et al (2016) suggest that those roles or actors’ functions on which innovation systems are structured may serve to guide the selection of actors represented in the foresight discussions.

- The third step is the **anticipatory phase**, which normally gives rise to a number of shared scenarios or visions of the future. The selection of methods for this future anticipation is a multi-factor process that usually involves a combination of several techniques (Popper, 2008a, 2008b). This phase is normally supported by participative and interactive workshops. A foresight workshop is a “temporary socio-spatial crystallisation of expertise, with a particular sort of socio-spatial group dynamics, in which different instruments and tools are deployed in order to endorse knowledge creation” (Dufva & Ahlqvist, 2015, p. 252). This phase is an essential step of foresight as participants deconstruct existing present narratives or contexts and create new empowering and plausible ones for themselves (Inayatullah, 2004). By co-developing new narratives and visions, people develop a sense of engagement and ownership (Ramos, 2017).
In contrast to the recommending phase of foresight, future anticipation has been very intensively studied in the literature. Many efforts have been actually dedicated to understanding the methods behind future exploration and trying to clarify how actors interact during the process (Keenan et al, 2002, 2003; Popper, 2009; Popper et al, 2011; Popper, 2008a, 2008b; Porter et al, 2004). Less attention has been put, however, to improve and integrate these anticipatory methodologies (Porter et al, 2004). Although there is profound diversity of future anticipation tools, foresight practitioners basically reiterate a set of usual and familiar approaches, with little awareness of new or alternative ones (Eerola et al, 2011). Such a variety of existing methods could be reduced by taking into account the experience and preferences of the study group (Coates, 2010). A wide review of foresight methods used worldwide was conducted by the European Foresight Monitoring Network. An analysis of how methods are being selected can also be found in Popper (2008a).

New future thinking methods include ‘storytelling’, which engage participants in co-creating futures and using many types of media (von Stackelberg & Jones, 2014). Other experimental methods imply living narrative contexts with actors and scripts that induce questions on the future (Candy, 2010; Dator, 2013). Head (2011) developed ‘Forward Theatres’ for navigating through alternative futures, thus encouraging drama, debate and dialog on future possibilities.

Dufva and Ahlqvist (2015) question whether the generation of creative ideas (out-of-radar knowledge) depends on the imagination of people in this sort of foresight processes, or instead are predominantly induced by the future anticipation methodology. The images of the future that the participants have give rise to a ‘shared collage of futures’ (ibid.) which is a valuable output of the workshop on its own, and also supports the generation of actions.

- The visions of the future constitute the baseline for the recommending phase, which is supposed to ultimately generate a range of action alternatives or recommendations. It has practically gone unstudied in the literature, and motivated this thesis, to what extent and how the outcomes of the anticipatory phase are in practice used during the recommending phase to generate this advice. This poorly understood aspect of foresight is particularly critical, as the implementation of these recommendations would potentially contribute to transform the future in line with the sponsor’s objectives. The importance of generating solid and sound recommendations is also implicitly recognised by Uotila et al. (2005) who claim that the legitimacy of foresight is sometimes challenged and put into question due to loose, connections between the foresight activity and the decision-making process. It is therefore crucial that foresight results, in particular the policy advice, are perceived to be strong ones, and that stakeholders feel strengthened and empowered by robust recommendations (De Smedt, 2006).

Dufva and Ahlqvist (2015) state that the facilitation activity also affects the flow and eventually the results of foresight discussions. Their analysis suggests that facilitators can drive discussions around one specific topic to foster a profound understanding of the theme
among participants, or lead the discussions towards radical and creative ideas. Apart from this latter, creative sort of knowledge (radical ideas resulting from out-of-the-box thinking) three other types of knowledge maybe found in foresight exercises. These are: codified knowledge (supporting knowledge launching the process, and outcomes, recommendations, etc. generated during the process), articulated knowledge (interim or provisional knowledge inherent to the foresight analytical process), and embodied knowledge (intrinsic to the participants).

- The transformation phase constitutes the last step of foresight. According to Popper and Teichler (2011), potential transformations include, among others, capacities, strategies, paradigms, socio-economic systems, and behaviours. Such transformations have to comply with initial sponsor’s rationales. In general, creating a shared understanding of future possibilities and an agreed vision of the future bring about stronger impacts than any other foresight tangible output (Saritas et al., 2013). Tuominen et al (2015) believes, for example, that scenario-based approaches constitute valuable tools for value network development. According to Piirainen et al (2016) foresight workshops have the capacity of replicating the structure of innovation systems and devise actions for its future transformation.

c) Foresight applications

Beyond its utilisation in research and innovation, we will also briefly address in this section the application of foresight to grand challenges, strategic planning and social innovation.

- Foresight for research and innovation

One expression of the interest that human beings have in anticipating future events and induce transformations can be found in the formulation of policies. Forward thinking is frequently used by governments to reduce political, socio-economic or technological uncertainties.

In this respect, the utilisation of foresight for research and innovation policies is not new. The interest in exploiting the foresight potential, either by constructing and delivering R&I policy advice, or facilitating knowledge sharing through networking, has increased in the last two decades in Europe. Relevant foresight transnational projects on STI include, among others, ‘FarHorizon’ (EC, 2008), ‘Major challenges for the governance of national research and innovation policies in small European countries’ (TEKES, 2008), ‘Innovation Futures’ (EC, 2009a), ‘Policies for Research and Innovation in Small Member States to advance the European Research Area’ (EC, 2009b), ‘Research & Innovation Futures’ (EC, 2011a), or ‘Forward Visions on the European Research Area’ (Daimer et al, 2015). Foresight also supports socioeconomic development and promotes relevant STI specialisation, as illustrated with the integration of foresight into the regional RIS3 (EC, 2012a).

The first debates on the relations of foresight and innovation were addressed by Martin (1995). He emphasized that foresight facilitates processes whereby system actors articulate their visions on the future (Communication), shares and enables actors’ mutual learning on
views and objectives (Consensus), changes actors’ mental models to foster behavioural change (Commitment), builds agreement to the collective conclusions (Coordination), and creates new networks/partnerships that can “wire up” the innovation system (Concentration). A more recent approach suggests an “innovation system foresight” concept that recognises the usefulness of foresight to address the complexity associated to innovation and the linkages between actors and institutions (Andersen & Andersen, 2014). An example of foresight supporting collaboration of R&I actors is given by the Technical University of Denmark (Andersen, 2012) which launched a programme, in collaboration with business associations, enterprises and ministries, to a) define strategic technological areas, b) identify barriers and opportunities, c) support sectors with advisory services and d) strengthen their infrastructure.

Foresight can be also used to establish or consolidate university-industry relationships. An example of this sort is the Manchester Knowledge Capital collaboration, which put together the interest of the University of Manchester and the Science Park, thus building a common vision (Manchester as a ‘Knowledge Capital’) between stakeholders (Harper, 2003; Harper and Georgiou, 2005).

Probably more linked to education policies than to research is the utilisation of foresight to support the universities’ third mission. This mission embraces applied research, development and innovation, and social engagement with society, thus expanding the traditional missions of education and research (Laredo, 2007). Piirainen et al (2016) propose the use of foresight to fulfil the third mission by fostering communication and dialogue between universities, industry and society.

Foresight can also foster innovation in public procurement activities by making suppliers and buyers aware of possible alternatives beyond their existing market relations and perceptions (Georghiou et al, 2014). Foresight, in particular roadmapping methodologies (Phaal et al, 2004), can provide future intelligence and build useful bridges between demand and supply. By adapting foresight to the procurement circumstances we would also avoid reiterative decisions on very particular solutions, involve users to learn their experiences, and promote innovation through purchasers’ feedback (Georghiou et al, 2014).

- Foresight for grand challenges

Foresight has the potential to put together different actors’ perspectives, foster interdisciplinary discussions and connect social deliberating processes with policy formulation, which are indispensable conditions nowadays to find adequate solutions to societal challenges. The notion of societal challenges is a central pillar of Horizon 2020. Foresight can contribute to the identification of challenges, their articulation, and to the alignment of actors around those challenges (Georghiou & Harper, 2013). Although Schoen et al (2011) ask for tailoring foresight to address the requirements of very specific fields or sectors, foresight, in general, provides a holistic and cross cutting approach to the circumstances inherent to broad problems and big challenges.
Addressing climate change, for example, demands the combination of foresight with impact assessment, simulation modelling and societal embedding tools to analyse and support systemic transition-related decisions emerging as a consequence of these challenges (Auvinen et al, 2015)

Tuominen et al (2015) introduce a prospective value network approach, and a transition-oriented perspective, to create future images of transport systems and energy related challenges. A common vision shared by the stakeholders can facilitate a better understanding of markets, regulations, policies, values, resources, technologies and infrastructures.

- Foresight for strategic planning

The application of foresight to business planning and organizations management is usually recognised as strategic foresight. Strategic foresight is implemented to envision new societal horizons, detect emerging and disruptive technologies, and explore weak signals in organizations (Heger & Rohrbeck, 2012). Although organizations sometimes restrict foresight to the creation of success scenarios, the strength of the process exists in the interpretation of scenarios and their utilisation to take decisions from the perspective of management and business planning. This difference is analogous to the distinction between strategy as ‘something that an organisation has’ and strategy ‘as something people do’ (Whittington, 1996).

Foresight in companies has the capacity of describing a variety of future alternatives and preparing stakeholders to address this variety, thus driving companies into targeted directions (Uotila et al, 2005). Foresight thus helps organizations to identifying future actors’ potential actions and values changes (Tuominen et al, 2015).

Foresight can also be a strategic instrument for research and technology organisations. RTOs are “typically shaped by the divergent goals and interests of different groups, each of which have sufficient power bases to ensure that their goals are legitimate to the strategy of the organization” (Jarzabkowski & Fenton, 2006, p. 631). Their R&I rationales cover from basic research to applied research and, in addition, include engagement and commercialisation goals (ibid.). Foresight thus supports RTOs on the alignment of governmental targets, scientific communities’ interests, and the organization official strategy (ibid.). Another point of view is given by Georghiou and Keenan (2009) who indicate that foresight provides a ‘hybrid forum’ in which different organisational communities are linked and immersed in a process of future-oriented ‘contemplation’. Weber et al. (2009) claim that foresight facilitates a strategic orientation based on a) a self reflection as for the position that the organization actually has with respect to emerging and future technological developments, b) a continuous strategizing process across the different organizational scales, and c) an open communication of the foresight process through the organisational levels.
**Foresight for social innovation**

In the context of social change, there are also foresight contributions. Foresight can be a trans-disciplinary tool or interface to link social innovation to creative industries, art, innovative services, and cultural enterprises. It can be implemented, for example, to leverage social services and innovation, based on the needs of end users (Stickdorn & Schneider, 2012).

Interestingly, as for the social impact of foresight, Amanatidou (2014) proposes an assessment framework to evaluate how foresight programmes can contribute to develop more participatory knowledge societies. She finds foresight can contribute through three building blocks: a) a ‘building knowledge’ block that supports the development of strategic visions, b) a ‘building networks’ pillar that facilitates dialogue, negotiation, and cooperation between stakeholders, and c) a ‘building participation’ block that captures different perspectives into the decision-making process in order to devise and agree on joint actions towards common future visions.

### 2.3.2. Foresight epistemological aspects: a realist characterisation

The aim of this section is to apply an epistemological lens to the knowledge generated with foresight. This is actually an innovative perspective to explore the nature of futures studies. Critical realism provides an adequate ontological frame for this purpose insofar as it aims to explain what characteristics should social practices (like foresight) have to become an object of scientific knowledge. Unlike positivists, critical realists argue that the social world be explained not only in terms of observable and empirical regularities, but also as the result of understanding the complex relation of human agents and interaction mechanisms.

It is broadly accepted that social sciences demand a wide utilisation of common sense to understand and interpret these mechanisms. In fact, by applying common sense thinking in foresight, our initially incomplete intuitions about how structures and social problems may evolve in the future become important insights to develop and implement solutions today.

Social researchers also recognise that other aspects, apart from common sense, have strong influence on the construction of theories that explain social processes. The following discussions give a brief description of some of these aspects from an epistemological perspective. In particular, and given the focus on policy advice of our research questions, it is useful to look at the influence of institutional structures on the foresight participants’ behaviour, the effects of participants’ values on the foresight outcomes, and the complexity inherent to the issues addressed with foresight.

a) Social structures and human choices in foresight

Understanding how institutions or other social structures interact with individuals is a crucial and ambitious task for social scientists, and it requires the interpretation of how social processes can affect the power of the human agency (Bhaskar, 1979).
According to Porpora (1989) social structures are linked to those collective rules and resources that usually structure behaviours. Foresight replicates to some extent these rules, as it represents a social structure for actors’ interaction. Archer’s morphogenetic model takes into account the temporal dimension, arguing that social structures are the product of actions undertaken in the past. Structures are historically developed and they condition but do not determine human agency (Archer, 1995).

Structuration theory (Giddens, 1984) is neither aligned to Archer’s theory on pre-existing historic structures nor with the reproduction of processes. This theory emerged as an ontological alternative to the competing theories of Weber’s individualism and the Durkheim’s social determinism. Critical realists accept Giddens’ explanation on the relation between structures and agents: structures are constituted by the agents and they are also a medium for this constitution. According to this duality, institutions and actors are inextricably linked. In fact, one challenging task of foresight practitioners is to differentiate participants’ personal insights from those ideas emanating from the structure (institution or organisation) to which the agent (participant) belongs.

For Goldstein (1993), the embedment of ideas in institutions has long-term effects in policy making, since they provide stability and path dependence to the public policy. Sometimes, this path dependence is evident, e.g. we can see how similar ideas are adopted by different institutions. In fact, institutions often reiterate the same organisational behaviours and give rise to different varieties of institutional isomorphism (DiMaggio & Walter, 1991).

Although critical realists made different attempts to describe the nature and evolution of social structures, less emphasis was put to analyse the role of structures as potential inducers of individuals’ behaviour changes. Human choice is a power whereby one individual could have acted in a different way than he/she did; and persons, when taking part in social structures, are actually exposed to influential inputs which may eventually induce changes in their choices.

Bhaskar (1989) presented the individual’s embedding into pre-existing structures as the first phase of a transformational model of human activity. He suggests that, in a second phase, structures are transformed by agents. In other words, Bhaskar’s social structures are intended and unintended outcomes of social action.

In relation to foresight recommending processes, it implies that although neither the participants’ action (through their own decision making processes) nor the enabling foresight procedures can independently determine the resulting foresight advice, at least they can jointly shape and condition such advice.

b) Values and subjectivity in foresight practice

The influence of structures limits the participants’ freedom for unveiling their particular values and preferences during foresight discussions. However, human thoughts are always embedded with personal perceptions and beliefs. For Sayer (1992), agents not only have personal beliefs and socially constructed opinions, but their roles and identities within
structures are part of their personal attachment, thus shaping their behaviour. Interpreting individuals’ meanings requires an analysis of inter-subjectivity to distinguish how social groups interact (ibid.)

One of the strengths of critical realism’s ontology is to provide a conceptual framework whereby social scientists, to configure scientific explanations, can deal not only with material evidence (i.e. empirical experiences, causal powers, governing mechanisms and structures) but also with value-laden elements. In the same way as Psychology focuses on understanding individual beliefs, critical realism aims to analytically penetrate into social structures, as objects of knowledge, to identify their values. This gives us the possibility of using rational judgements to explain the interaction of society elements at the same time allowing the influence of collective values and preferences to be taken into account. In critical realism collective beliefs have to be treated as additional inputs or drivers when scientists build theories. As social activity of human beings is not value-neutral, critical realism constitutes a useful framework to understand value-laden social systems.

In the case of foresight, we usually come across the problem of staying at a distance from participants’ own values. What guarantee is there that advisors have left aside their biases or personal preferences? How much relevance can foresight give to personal interpretations?

Two brief reflections can be made in relation to these questions.

Firstly, let us see foresight as a social experiment. Like any other social experiment, foresight finds great difficulties in simulating social processes in closure conditions. That is actually one of the most important of critical realism’s handicaps, since experiments in open systems, in contrast with closed ones, take into account overlapping social mechanisms and effects. To understand the linkages and interactions of such mechanisms and effects, foresight, in practice, has to contrast observations and reconstruct conclusions in a sort of reiterative feedback and confirming process to guarantee that the open system is considered and the contextual circumstances properly acknowledged. In other words, the analysis of foresight data needs to confront value-laden opinions or questionable assumptions with the rest of participants’ insights and other observable context information in order to elaborate more neutral advice.

Secondly, let us observe foresight as a social expression. Social interaction is essentially a dynamic process, and the relations between its social elements (individuals and institutions) also evolve very quickly. Human values change whenever these relations change. In society, for example, most of such changes are linked to actors’ interactions (e.g. finalisation of trade contracts) as well as to human relations (e.g. dissolution of a labour dependence). This dynamism could be seen, in principle, as an obstacle to the reliability of foresight outcomes. However, changes in human values have a lower impact in social disciplines than in studies of individuals (e.g. Psychology) due to the greater stability that collective values have in comparison to those of individuals. Participation reduces the vulnerability of foresight to value changes, as a matter of fact, the expression of the group’s values and preferences,
formed with the aggregation and consolidation of each participant’s beliefs, make foresight outcomes reasonably durable and sustainable.

c) Foresight for understanding social complexity

The problem of complexity could be considered the leitmotiv of some philosophical proposals such as critical realism or social constructivism. The existence of many complex interactions and relationships between constituent elements of social systems is not contested by positivist mainstream thinking. As with understanding nature’s behaviour, clarifying social systems behaviour is a difficult endeavour. Foresight practitioners, as social scientists, not only have to tackle formal empirical interactions - visible or well defined relationships between elements and data - but also deal with the added difficulty of hidden interactions within the addressed system. This is clearly not a favourable context for identifying common points and proposing causal explanations to complex policy problems, not least because social processes are unavoidably interconnected.

In this sense, Bhaskar admitted that social and psychological mechanisms only occur in open systems. However, he suggests using not entirely open systems for exploring and identifying social processes mechanisms. Rather than maintaining the dichotomy between open or closed systems we may instead admit the use of control groups and iterative explanation processes to conduct social experiments (Bhaskar, 1986). At this point, we observe that Bhaskar’s approach to social processes studies reflects important aspects of foresight, like the use of interactive focus groups of discussion, the importance of promoting debate, and the importance of representing in foresight projects different actors’ perspectives. As for the latter, Woodside & Wilson (2003) assume that only by analysing data through diverse theoretical lenses can researchers understand reality.

Similarly, Bhaskar and Lawson (1998) advocate the use of contrastive explanations as a way of approximating to general laws in complex social studies. This approach has similarities to the process whereby foresight analysts (also known as foresight ‘mediators’ in this thesis) construct conclusions drawing on different actors’ points of view. Basically, Bhaskar introduces the idea of demi-laws to explain how knowledge is generated through a process whereby in a first stage some patterns and regularities are detected (somehow reflecting the overlapping analysis of foresight participants’ insights), and then an explanatory process would accommodate observations into a final explanation (to some extent reflecting the final argumentation process in the foresight recommending phase). Although there is some risk of subjectivity (foresight practitioners’ interpretation could eventually introduce partialities or infer inconsistent or semi-constructed conclusions) what they defend is the virtue of dialogue and the awareness that explanations of social problems have a crucial context-dependency. In foresight, imagining future contexts helps elaborate these explanations (e.g. by discussing consequences of transformed and creative future scenarios). Creativity and imagination are important instruments to address complex social problems. A brief review of creativity as an element of human intellect is provided in the following section.
2.3.3. Foresight as a collective thinking process to enhance human intellect

This section reviews and discusses the principal functions of intellect, with special attention to creativity. The review is based on foresight advice being an expression of human intelligence, as it represents the aggregation and synthesis of many individuals' thinking processes.

One classical but still broadly accepted theory of human intellect suggests that intelligence is the result of five major human capacities: cognition, memory, evaluation capacity, convergent thinking and divergent thinking (Guilford, 1967). Cognition relates to the human capacity of knowing and discovering aspects related to the problems to solve. Memory enables individuals to retain and store personal experiences and learning so that they can use them in future situations. Evaluation is the capacity of individuals to compare a variety of information based on a set of logical criteria. Convergent thinking relates to the logical constructions produced from previously learnt (cognition), retrieved (memorised) and mutually compared (evaluation) information. Convergent thinking is normally associated with pure rationality and is applicable to decision making processes as far as there is sufficient reliable information to infer adequate solutions to the problem. Divergent thinking also makes use of learnt, memorised and mutually compared information but, in contrast to convergent thinking, it essentially refers to the human ability to deliver a variety of different and creative responses to the same problem.

These individual’s cognitive capacities can be enhanced with collective thinking processes, and in particular with foresight. Mutual learning, for example, can be fostered due to the interaction of people in participatory processes. Interaction also stimulates our capacity for reminding and recovering (memorising) our own past experiences. In addition, foresight facilitates an effective context for comparison, as the participants have the opportunity of evaluating and challenging their own conception of problems with other actors' opinions.

From a broad perspective, Sternberg (1985, p. 45) suggested that human intelligence is a “mental activity directed toward purposive adaptation to, selection and shaping of, real-world environments relevant to one’s life”. More related to the generation of ideas and foresight recommendations, Sternberg's triarchic theory (1985) suggests that intelligence is composed of three parts or dimensions: a) a componential dimension related to the human capacity for analysing problems (in the case of foresight this analysis is based on future scenarios), b) an experiential one related to creativity and intuition (a high volume of original ideas is aimed in order to facilitate the selection of the best alternatives to solve foresight problems), and c) a practical dimension related to adaptation to context (to ensure that delivered solutions are compatible with the contextual circumstances).

The discussion below is focused on the capacity of foresight to promote divergent thinking and foster creativity. Creativity refers to Guilford’s above mentioned conception of ‘divergent thinking’ and the Sternberg’s second dimension of human intelligence.
From an epistemological perspective, creativity is consubstantial to the development of scientific theories. Critical realism actually enables social scientists to generate creative explanations of real-world laws (Bhaskar & Lawson, 1998).

David Bohm (1998) assumes that creativity is represented differently across disciplines. While creativity is described, for example, in mathematics as a “problem solving”, in the area of music creativity is recognised as “performance” or “composition” (Reid & Petocz, 2004). Creativity can be manifested in many areas of human life, from daily issues to the academic context. It is a process-attitude-behaviour combination that can be expressed, for instance, through artistic pieces (San, 1993). Also from a broad perspective Ark (1987, p. 226) affirms that creativity is the ability to produce “new ideas, opinions, discoveries or artistic objects which are valuable for social, moral, aesthetic, scientific or technological use”.

In relation to the generation of ideas, Torrance - a classical scholar on creativity - in 1969 defined creativity as the ability to identify gaps, propose alternative solutions to problems, generate new ideas, combine insights, and unveil relations between these insights. Other definitions do not refer to creativity in relation to problem-solving processes. Swede (1993), for example, understands creativity as a process to produce ‘unique’ and ‘valuable’ ideas rather than identifying a solution to a problem. Rietzschel et al (2010) claim that ideas, to be creative, need to be original (unusual) and also feasible (useful).

Although general aspects of creativity differ between individuals, there is a consensus in the literature on the four cognitive functions that give sense to the concept of creativity. These factors are fluency, originality, flexibility, and elaboration. It is broadly accepted that these four aspects need to be taken into account when measuring the outcomes of divergent thinking processes (Guilford, 1950; Torrance, 1968, 1974; Amabile, 1983; Weisburg, 1986; Paulus, 2000; Kincaid & Duffus, 2004). Fluency refers to the capacity of creative persons to produce a high number of ideas. Originality is the faculty for proposing more innovative and different ideas than other people. Flexibility relates to the ability to look at the problems from different angles or perspectives. Elaboration is associated with the level of precision and specification (level of detail) that creative people present in their ideas or creations. These four properties are useful to distinguish the work of creative people from other type of works. In the case of policy advice, these functions might be utilised to assess the capacity of participatory processes, like foresight, to stimulate the generation of creative ideas.

Sternberg and Lubart (1991) proposed an ‘investment theory’ to understand the nature of creativity. This theory assumes that creative people are those who are able to transform non-creative and unattractive ideas in more valued ones that can be ‘sold’ to others. Creativity can be understood as the development of initially unknown or discarded ideas that, however, may have a high growth potential. These ideas find, therefore, an initial resistance to overcome.

Sternberg’s theory understands creativity as the convergence of six resources: a) intellectual abilities, b) knowledge, c) styles of thinking, d) personality, e) motivation, and f) environment. Sternberg affirms that the integration of these elements favours creativity. Intellectual abilities
relate to the capacity of generating ideas that other individuals have not yet identified, and being able to discern which ideas are the best. Knowledge resources permit an awareness of what ideas others have already discovered and developed in the area (or will be potentially developed). Style of thinking relates to the individual's attitude to sustain and maintain a creative effort over time. Personality resources refer to the predisposition to assume risks and overcome problems. Motivation resources encourage creative people not only to do things differently but to actually put into practice their creativity. The environment issue involves creative individuals being able to interact and establish relations with other actors that facilitate their creative capacity (Sternberg & Lubart, 1995).

From another point of view, creativity processes can be seen as the ability to a) separate relevant from irrelevant information, b) compare and link new insights with earlier knowledge, and c) combine separate pieces of data in a useful and innovative way (Davidson and Sternberg, 1984).

As for the characteristics of creative people, Amabile (1983) suggests that there are three components to be considered: individual's abilities in the knowledge area or field, his/her abilities for creativity, and his/her motivation. Creative people have ability in a specific field because of their (formal and informal) knowledge, technical skills, and personal talent. Ability for creativity is related to their cognitive style (i.e. the capacity for understanding and analysing complexities, tolerating risks and ambiguities), their heuristic abilities, and their perseverance in finalising their creative work. Finally, motivation refers to the individuals' attitude to and perception of the intrinsic reasons underlying their creative effort.

Finally, some authors relate creativity to situational factors. This refers to the manner in which creative people perceive contextual problems, interpret complex works, identify different alternatives to problems, explain ideas, select between solutions, and are committed to the creative work (Amabile, 1983). In this respect, Csikszentmihalyi (1988) believes that creativity is not to be considered as only an abstract mental process but also as a result of interaction between the individual and the socio-cultural context. Csikszentmihalyi's model is composed of three elements: the creative domain, related to the knowledge area, the field of work, which encompasses influential actors in the area, and the individual, who creates something new with the symbols and elements of the given domain.

This review has tried to reflect on the extent to which the basis of collective intelligence is inherent to the characteristics of the human intellect. In reality, it would not be reasonable to investigate and explain participatory thinking processes without previously understanding those individuals' cognitive factors that make them possible and give them sense.

Among existing collective thinking processes the generation of recommendations with foresight is probably the one that most clearly represents a practical use of creativity. During this research, it would be important to be aware of the different notions of creativity, as well as take into account the implications that the main components of creativity have for policy advice.
2.4. Conceptual framework

The objective of this section is twofold. First, it highlights the suitability of foresight to address research and innovation policy issues. To some extent, the arguments provided aim to justify why this thesis (“Understanding the generation of research and innovation policy advice with foresight processes”) has specifically addressed this area of inquiry. The second objective is to integrate, and schematise in a conceptual framework, the rationales that support the literature explored.

The confluence of problems, policies and politics, as suggested by Kingdom, explains why research and innovation is effectively a relevant area for fully-fledged foresight application. Foresight projects, when promoted by policy makers, are actually spaces (or windows of opportunity) where these three streams can converge. R&I foresight has the potential to replicate the nature of problems, policies and politics in experimental or control groups, as suggested in 2.3.2 c), thus facilitating a better understandings of R&I challenges.

The multiplicity of actors represented in these groups makes wider the spectrum of perspectives from which the R&I community can observe complex and multifaceted problems. In addition, foresight is also multidisciplinary, which helps to interpret more efficiently a field that is normally subjected to industrial, social, academic, and scientific governance ups and downs.

Assisting R&I developments with foresight requires that decision makers recognise the capacity of the instrument for formulating, monitoring or evaluating policies. Foresight exercises can be designed, for instance, to conceive and plan specific supply- or demand-side long-term strategies. The connection and interaction of multiple R&I actors along the foresight project (e.g. incorporating diverse areas of research or even different economic actors) can support the elaboration of wide and cross-cutting policy programs, or the definition of more responsible research and innovation policies. In terms of scope, foresight has a long tradition in approaching regional, national, or supranational R&I policy problems.

As with other participatory instruments of intelligence, we have to accept that foresight is not immune to politics and ideological preferences. However, the systematic use of futures and the integrity of facilitators and mediators in foresight bring in objectivity to the advice process - in contrast with other less participative and more ‘vulnerable’ advisory modalities - and raise barriers to ideologically driven thinking. Despite actors’ discrepancies, a rational and practical commitment is agreed in foresight between all the engaged R&I actors to achieve consensus that, while there may be winners and losers, will in sum benefit the whole R&I system. The development of R&I advice implies that foresight participants select or discard policy alternatives through an objective and evidence-based (experts’ judgements) process. Questions of integrity, responsibility, engagement, or neutrality, among others, are inherent to advice theory and practice, especially when such advice stems from people participation and tries to address, with the use of futures, so a complex and multidisciplinary areas as research and innovation.
The Diagram 1 describes a conceptual framework of the literature reviewed in this thesis. Presenting this framework, just after exploring policy/practical, participatory and prospective dimensions (sections 2.1, 2.2, and 2.3, respectively), and just before the methodological chapter 3, is intended to the reader to better understand the research process and to recognise how theoretical references and literature will be later mobilised throughout the analytical chapters.

Diagram 1 Conceptual framework

As presented in the Diagram, understanding how R&I advice can be generated with foresight processes implied, firstly, to explore existing theories of advice. The review of the advice literature (section 2.1) contributed to identify different aspects and factors that, in general, can explain the advice utilisation (acceptation) by decision makers. A very particular type, policy advice, was then conceptualised. As foresight necessarily demands actors' participation, a review of individuals' attributes and actor's salience models (section 2.2) preceded the description of the prospective dimension (futures) related literature (section 2.3).

Foresight, by promoting the utilisation of futures in group-thinking processes, enhances the functions of human intellect as explained in 2.3.3, being convergent (rational) and divergent (creative) thinking the greatest exponents of this enhancement. Rationality and creativity thus play a definite role in, respectively, reinforcing the logic and originality of the advice discourse. Given that the objective of creating and giving advice is to support decision-making processes, the evaluation of such an advice should also include, as suggested in Diagram 1, the evaluation of recommendations' strength or soundness.
3. RESEARCH OBJECTIVES AND METHODOLOGY

3.1. Research motivation and questions

Despite its relevance for policy making action, the generation of policy advice through participatory processes has not received enough attention in the literature. Our review has served to confirm, however, that there is a long and complex road between the formulation of policy advice and its implementation during which a range of factors intervene.

Policy decisions depend on a variety of inputs and political influences. In addition, socioeconomic and technological contexts change very quickly. As a result, policy decisions are sometimes based on reasons than are different from the initial rationale.

In these circumstances the acceptance or rejection of policy advice cannot be used to justify its quality or deficiencies. What is needed is a more profound understanding of the processes utilised to generate such policy advice and the factors that contribute to configure the advice characteristics.

Understanding collective advice processes could help policy analysts and advisors to anticipate to what extent the advice generated and delivered by these processes might be assimilated and accepted by policy makers, in spite of unavoidable political interference.

In the case of foresight this understanding is particularly important, in as far as it remains unclear, within foresight processes, the future anticipation phase is capable of feeding and connecting to the foresight recommendation process in order to produce consistent advice.

Although, in principle, participants’ profiles have influence on the characteristics of foresight advice, there are many other influencing factors that need to be studied.

Based on the previously mentioned concerns, the general objective of this research is:

**To understand and explain how R&I policy advice can be generated with foresight**

More specifically, the thesis will try to study and understand both foresight recommending processes and outcomes, combining these studies in an attempt to answer the following specific questions:

1. What are the main factors that influence the generation of advice with foresight?
2. How can the connection between the future-anticipating and recommending phases of foresight be explained?

3.2. Research methodology: epistemological justification and design

Understanding social systems usually requires identifying the drivers that govern their structures as well as observing social actors’ interaction. Similarly, exploring foresight processes involves identifying what influencing factors exist behind its methodologies and observing how, throughout these processes, actors’ insights actually emerge and evolve in relation to other actors’ thoughts and opinions.
It would be difficult indeed, and probably imprecise, to study and interpret this highly social activity with a positivist approach. To understand social problems researchers actually need to look at the problem from a variety of angles and consider different actor’s perspectives. Critical realism assumes that, given that knowledge is socially produced, communication and debate is needed when analysing social questions (Bhaskar, 1986). Accordingly, it encourages researchers to be open-minded when designing research methodologies.

This thesis is epistemologically based within this critical realist position. This normally involves the utilisation of a mixture of tools and methods in an attempt to acquire a broader vision of the real world. In particular, action research can contribute to examining the foresight process in depth and from within, thus facilitating effective analysis and debate on the manner in which policy advice is generated.

Drawing on the epistemological premises above, this thesis will be supported by two methodological pillars:

a) case study analysis for identifying those factors that have influence on the policy recommendations generated with foresight, and

b) action research for observing in depth the foresight recommending process and how actors interact. It will also serve to confirm the relevance of the identified influencing factors.

Both pillars may facilitate a profound understanding of the foresight process, which is essential to tackle the research questions from a realist perspective.

As previously stated, this approach also involves the utilisation of complementary research tools. A very relevant one, which to some extent could be considered an additional pillar of this research, is critical discourse analysis. The utilisation of discourse analysis constitutes per se an innovation in the practice of foresight research.

Diagram 2 describes the overall research process. The Diagram distinguishes (coloured boxes) the aforementioned research pillars. Around them the Diagram also presents several auxiliary and supporting research tools. It further shows those results which are supposed to be obtained as a result of the research strategy, as follows:

- **foresight recommending factors** that influence the generation of advice, thus potentially giving a consistent answer to our *first research question*.

- **explanation of the connection between anticipation and recommendation phases** of fully-fledged foresight, thus giving a reasonable answer to the *second research question*.

A detailed and sequential description of the research process is described below:

1. Review of more than fifty foresight projects for case studies selection.
2. Documentary analysis and identification of policy recommendations in the previously reviewed foresight projects. An initial draft of the most usual advice formats and
characteristics was made to understand how the foresight outcomes (recommendations) could be studied and assessed.

3. A review of policy advice and argumentation literature served to reinforce the understanding of the most frequent policy advice characteristics. The theory of argumentation facilitated the adaptation of the traditional critical discourse analysis to the analysis of advice discourse.


5. Critical discourse analysis (CDA) of case study 1: the adaption of CDA to policy advice permitted the study of advice discourses according to three analytical layers: a) advice description, i.e. a characterisation of recommendations and objectives, b) advising process interpretation, i.e. the analysis of the foresight advising process, and c) advice explanation, i.e. a critical discussion of the relations between the advice characteristics, the advising process, and the external context or circumstances. The discourse analysis aims to explore how foresight advice may be argued and delivered, in an attempt to identify advisors' explicit and implicit suggestions, preferences and meanings throughout the narrative.

6. Action research: facilitation of seven foresight workshops in the VERA case study

7. Action research: data processing and analysis of raw material generated in VERA (processing, clustering, synthesising 1400 primary insights from 7 foresight focus groups) in order to identify patterns and correlations of foresight empirical data. Thus a clearer vision of actors' recurrent insights and preferred discussion themes is obtained.

8. Action research: confirmation that the elicited insights or ideas were not already implemented by the European Commission.

9. Action research: synthesis and elaboration of VERA policy briefs and policy reports (co-authoring with The University of Manchester team).

10. Analysis of the case studies’ results: identification of key findings

11. Interviews with advisors, EC officers, advice implementers/policy makers, and foresight coordinators to confirm the relevance of some findings, triangulate results, and complement them with other advice-related perspectives.

The first two sections of this chapter have specified the research objectives and methodology and presented the two strategic pillars that support the process: case studies and action research. The third section will give a detailed description of the nature and the potential of case studies in qualitative research. The fourth section describes how the case studies were selected. The fifth part introduces relevant literature that may help to understand the role of action research as a strategy to observe and interpret social practice. Finally, and given the importance that argumentation has in the elaboration and interpretation of foresight advice, the sixth section explains the fundamentals of critical discourse analysis.
3.3. The use of case studies in social sciences research

3.3.1. Introduction to case study research

Although case study methodology is widely utilised in research, its definition is irregularly and poorly addressed in the literature (Van Wynsberghe & Khan, 2007). Gerring (2004) defined case study as an “intensive study of a single unit for the purpose of understanding a larger class of (similar) units” (Gerring, 2004, p. 352).

Robert Yin is the most relevant academic focused on case study research. His methodological work is an obligatory reference across various disciplines. Yin (2014) suggests a twofold definition of case study research that embraces aspects related to the scope of studies and aspects related to their features. As for the scope, the method can be seen as an empirical enquiry that explores a contemporary phenomenon within its real-world context, being particularly suitable when the boundaries between the phenomenon and the context are not obvious. As for features, case studies technically deal with complex situations where multiple variables are connected (which explains why holistic approaches...
are adequate for analysis), are supported by multiple sources of evidence (data triangulation is thus appropriate for analysis), and rely on preliminary theoretical assumptions (which guide the data gathering and analysis).

Case studies have a wide application in qualitative, quantitative, and mixed-methods research (Flyvberg, 2006; Stake, 2000). The method is widely applied in Social Sciences to address complex contemporary phenomena and gain a holistic perspective on the real world, thus being applicable to a variety of fields and contexts such as, for example, group behaviour, managerial processes, educational challenges, international relations, etc. (Yin, 2014).

Given the high relevance that understanding contextual circumstances has in case study research, the method is generally supported by direct observation and interviewing, although other complementary research tools are also utilised, such as surveys, documentary analysis, etc. In general, case study methodology makes use of multiple sources to facilitate a rich picture of the problem and context that the researcher aims to analyse.

Case study methodologies also enable researchers to explore complex types of linkages and patterns embedded in gathered data (Dooley, 2002). In contrast to interview studies, this methodology permits the investigation of multiple interactions and relations across actors, documents, or empirical data. The complexity associated with case study research therefore requires the definition of comprehensive strategies. These strategies normally try to respond to the necessity to ‘understand’ phenomena, i.e. ‘how’ or ‘why’ research questions, leaving somewhat aside other queries, like ‘how much’, ‘where’, who’, ‘what’, to be addressed by other methods, e.g. questionnaires, experiments or historic research (Yin, 2014).

Epistemologically, we may differentiate between positivist and interpretive case studies. The former have an explanatory dimension, and try to discover verifiable facts that could validate previous hypotheses. This deductive approach frequently has a statistical and quantitative nature. The latter have an exploratory dimension, and aims to inductively find explanations to the phenomena under analysis, thus adopting an epistemological position that allows a much profound understanding of the discourses that accompany these phenomena and unveiling power and knowledge relations affecting people’s behaviours.

Regardless their explanatory or exploratory orientation, case study methodologies are often challenged by critics with respect to its lack of rigour, principally based on the potential biases that researcher’s interpretations could bring along, or the difficulties for generalising results.

With respect to biases, it is important to acknowledge how researcher’s subjectivity may influence the research process and observe the intrinsic power relations of the creation of knowledge (Choi, 2006; Packer, 2011). An exercise of reflection is necessary to identify those power, knowledge and ideologies interfering in the research process (Choi, 2006). An adequate case selection, a balanced use of (multiple) data sources, and a clear
acknowledgement of researcher’s subjectivities increase the methodological rigour and contribute to strengthen the research process, mitigating methodological criticisms.

As for the generalisation of results, case studies need to select relevant and widely representative cases in the analysed context. In this sense, Bengtsson and Hertting (2014) propose a perspective of generalization based on ‘rationalistic social mechanisms’. Assuming that actors do things for a specific reason we could actually identify (from empirical observations of very representative case studies), some patterns or social mechanisms that could be also applicable in analogous actors’ constellations or comparable contexts. Adopting this perspective on generalisation implies recognising that actors would most likely act and interact with a minimum degree of rationality in similar circumstances.

3.3.2. Case studies design

One important design parameter of case study research is the unit of analysis. The unit depends on the nature of our research question, so may adopt different forms, e.g. individuals, institutions, parties, programmes, policies, marketing campaigns, and specific processes, among others. The data associated with the unit of analysis needs to be accessible during the research process and also on later stages, if possible, since further revisiting may be needed to expand or contrast explanations.

In multiple-cases approaches the unit of analysis is recommended by Yin (2014) to remain the same (or very similar) across the different cases, thus facilitating research validity. Another consideration needs to be taken regarding the possibility of utilising only one unit of analysis or several. Whereas the former is recommended when researchers try to get a holistic understanding of the case, the latter, i.e. the analysis of different units embedded in the case study, permits a more in-detail observation of certain parts of the phenomenon.

Time is another aspect to be considered when selecting units of analysis, especially in chronological-longitudinal studies. In fact, it is desirable that the phenomenon to be explored will evolve and provide enough research evidence along specific and clear time boundaries.

The selection of the unit of analysis generally is intrinsically linked to propositions about what to explore, what is the purpose of the research, and what are the criteria for a successful investigation. The answers to these queries will contribute to another important research design decision: the role of theory. Theory may be used as an input or an outcome of our investigation. As an input, researchers assume existing theoretical frameworks and then try to corroborate that these frames can be useful to fully (or partially) explain the analysed phenomenon. Conversely, from an outcome oriented perspective, case studies are used to understand and analyse holistically the phenomenon, thus developing explanatory theories. Other methodological approaches, e.g. Ketokivi and Choi (2014), describe the potential of case studies to generate theory (based on relevant and strong empirical evidences), test theory (based principally on existing and assumed theoretical frames), or elaborate theory (relying simultaneously on both existing theoretical frames and empirical evidences in order
to challenge and further develop the theory). In the same vein, Rule and John (2015) observe that there are several relations between cases and theory. They propose four types of theory-case relationships: a) theory ‘of’ the case, which explains the nature of the case and how the case is selected and investigated, b) theory “for” the case, which applies or challenges existing theories to the case in order to confirm, revise or reject them, c) theory “from” the case, which implies the inductive creation of new theories arising from the case, and d) theory–case interaction approach, which is based on the continuous dialogue between theory and data to construct theories or review them, while also devising other theoretical perspectives.

When designing case study research we may also wonder whether one single case may be enough to answer the research question or, by contrast, multiple-cases design is the most adequate approach. Verschuren (2003) asks for more clarity (in both approaches) to distinguish more effectively the object of study from the process followed to study this object. According to Yin (2014) there are five rationales that justify the utilisation of single cases:

a) Critical case: the case is a good representation of a reasonably well known theory, so as to confirm or expand it
b) Unusual case: the case shows a unique or extreme situation or phenomenon
c) Common case: the case is a common or typical representation of the phenomenon
d) Revelatory case: the case represents a unique opportunity to observe and learn about a normally inaccessible phenomenon
e) Longitudinal case: the case permits the undertaking of a longitudinal time-based analysis

Multiple-case research normally provides more robust results than single-case approaches. However, it means more complex analysis and demands a higher volume of resources. This may have practical implications, as this research strategy assumes that, similarly to experimental research, case analysis needs to be replicated.

One distinction has yet to be made between literal and theoretical replication (ibid.). Literal replication consists of the repetition of analysis to every case with the aim of obtaining repeated or equivalent results. The objective of theoretical replication, however, is to reproduce the analysis of the phenomenon in several groups of cases, which share different research propositions or context conditions, thus trying to complementarily contribute to theory development or to the confirmation (or rejection) of hypotheses. In the practice, social research problems are so complex that they usually require both types of replication.

In general, a two-cases approach can be considered a good option for case study research, as far as a) it provides a broader context than single-case (and more capacity for generalisation), and b) it may give rise to more robust outcomes when conceived in terms of theoretical replication.

Finally, some important observations need to be made as to the quality of case study research. Yin (2014) suggested four research validity criteria:
1. **Construct validity**: data collection needs to be based on subjective judgements about the question to answer. In this respect, data and their measures need to show a clear adjustment to the problem. This validity is favoured by the use of multiple evidence.

2. **Internal validity**: in explanatory cases there must be a clear description of causal relationships. This must be achieved by using logic models, identifying results patterns and confronting rival explanations to the phenomenon.

3. **External validity**: this criterion refers to the potential of research findings to be generalised. The domain where results can be applied needs therefore to be specified. Whereas in single studies generalisation happens through a convincing theory development, multiple-cases approaches can make use of literal or theoretical replication.

4. **Reliability**: the research procedures, which include data collection protocols and analysis, can be repeated. This makes the results more credible, facilitates the detection of mistakes, and reduces the risk of researchers’ bias.

### 3.3.3. Evidence collection

One of the most important instruments that researchers use to demonstrate the validity of their case studies is the utilisation of multiple sources of evidence (Yin, 2014). Data can consist of documents (including web-based), data records and archives, interviewing insights, direct observations, participatory observations and other sources (e.g. images, pictures, websites, etc.).

Documents need to be accessible during the investigation period and beyond. They are not prepared ad hoc for the research, and include enough precise data to facilitate analysis. They need to reflect no biases, although this does not mean that documents may not reflect author’s personal interpretations and perspectives on the topic.

Data records have to comply with the same requests as documents, and have a more quantitative nature. Certain records and archives can only be used if individual and organisational confidentiality and privacy is maintained.

Well-targeted interviews may provide rich information to the case study, thus contributing to establish analytical connections and develop findings. It is important to share with interviewees, in advance, the contextual circumstances, objectives and preliminary research conclusions, so as to elicit more relevant and meaningful insights.

Direct and participatory observations are very effective but highly time-consuming options. They are actually very useful and strategic procedures to analyse problems or phenomena in real time. Particular attention must be paid in participatory approaches given that a researcher’s intervention could potentially influence the natural evolution of the phenomenon and the corresponding research results.

Multiple data utilisation in case study research also enables investigators to develop strategies of triangulation. In fact, by corroborating the convergence of conclusions through
different data sources, researchers can more easily demonstrate the validity of the research process and reinforce the robustness of their findings.

### 3.3.4. Analysis and reporting

We have already commented on how important it is for case study research to define a comprehensive and analytical strategy. A valid strategy could, for example, consist of undertaking a rich description of the case study. It normally involves gathering numerous data and evidence that permit a profound understanding of the analysed case.

Another strategic option may prefer to put attention and efforts into verifying (or refuting) theoretical hypotheses that emanated from initial objectives, questions and reviews of literature.

A third possible strategy is focused on testing rival explanations. In this respect, Yin (2014) has proposed the following types of rivals that case-study researchers normally need to deal with:

- Null hypothesis: case study researchers need to demonstrate that rival conclusions are merely the result of chance circumstances
- Threats to validity: the research methods used to achieve conclusions show internal, external, or construct invalidity
- Researcher's biases: results are not valid due to interpretation flaws or personal influences
- Direct rival (for policies or programs): another process or intervention, different than the assumed one, explains the results
- Commingled rivals (for policies or programs): the process, together with other processes or interventions, accounts for the results
- Implementation rival (for policies or programs): the way the process or intervention has been implemented, rather than the process itself, explains the results
- Rival theory: there is another better theory to explain the results
- Super rival: a bigger theory, that includes the assumed one, explains the results
- Societal rival: results are just a consequence of social trends or circumstances

The acknowledgment of rival explanations encourages the researcher to challenge the case studies results. Being prepared for, or obtaining convincing answers of, these rival threats constitutes a practice that increases the credibility of final research findings. In this sense, rival explanation is often considered a technique rather than a research strategy.

Other analytic techniques that can be used in case study research are a) the identification and matching of observed and predicted data patterns, b) the development of theories by an iterative process of explaining and revising conclusions (somehow resembling a retrodiction process), c) the use of time analysis, d) the utilisation of logic models, and d) the comparative cross cutting analysis of multiple cases.
Given that the strength of cases studies is sometimes put into question, on questions such as an eventual lack of rigour or difficulties for generalisation, some research communication aspects, like structuring and reporting, acquire a special relevance. The way case studies are to be reported is actually a key aspect of the overall research strategy (ibid.).

We could decide, for instance, to adopt a *linear* structure, based on a sequential description of questions, literature, data analysis and findings.

Alternatively, we may opt for *comparative* structures, whereby the same case study is analysed from different perspectives or through several conceptual frames (resulting in different explanations or interpretations).

We may also use *chronological* structures, especially when studying longitudinal cases.

In other cases, it is interesting to use *theory-building* structures. These structures are theory blocks, which normally serve to present explanatory or exploratory investigations with a logic perspective.

Other modality consists of presenting *suspense* structures. The investigation starts with the research results, and the process followed to achieve such results is only described in the following sections.

Finally, case study researchers may also adopt *non-sequenced* structures, especially when the objective is to present the cases only descriptively.

### 3.4. Case-studies selection

In general, the selection of case studies essentially needs to respond to ‘what to explore’ and ‘what is the purpose’ questions. However, it has frequently to respond to other added criteria.

Yin (2014) proposes that *exemplary* case studies need to:

- a) be significant, i.e. selected cases have to offer revelatory potential (to cast light on phenomena that have not been studied before) and enable the development of theories
- b) be completed, i.e. selected cases have to offer clear phenomenon boundaries, full data collection possibilities, and have no time or resources restrictions
- c) have capacity for embracing alternative analytic perspectives, e.g. selected cases can resist the analysis and challenge of rival explanations
- d) provide sufficient empirical evidence, i.e. selected cases can deliver both theory-supporting and theory-challenging data
- e) be engaging, i.e. selected cases are able to capture the attention of both the investigator and readers.

Drawing on our research questions, in this thesis we have incorporated other criteria to the pre-selection process, as follows:

1. The pre-selected foresight cases finished after 2000. Uncompleted (ongoing) or earlier cases would be only selected if they are potentially relevant for our research questions.
2. The pre-selected cases preferably have a 2020-2030 horizon so that to capture the prospective dimension of fully-fledged foresight (some longer-term exceptions may be considered), be conceived for informing or supporting policy making (related to the policy dimension), and show some grade of actors’ participation (corresponding to the participatory dimension). Thus, they could be labelled as fully-fledged foresight (Miles, 2008).

3. The cases are relevant at the policy and political level. Given the focus of this research on policy advice, highly relevant and important cases would guarantee that their associated recommendations are discussed and their potential impacts considered before being delivered. In fact, policy recommendations obtained with potentially impactful projects could in principle constitute a more solid and reliable fieldwork to develop research.

4. They target complex research and innovation problems that, at European level, have been traditionally addressed with participatory projects, e.g. generating advice on systemic problems or grand challenges. This would hopefully permit to generalise results to a great number of other developed and ongoing foresight projects. The orientation of the case to R&I relates with the researcher’s experience and professional background.

5. The selected cases have to permit international generalisation, thus potential findings may be potentially applicable to a wide range of R&D and innovation policies worldwide.

6. They preferably use a range of qualitative methodologies for future anticipation that represent different grades of people interaction, expertise, use of creativity and empirical evidence.

7. The selected cases have produced verifiable and identifiable policy recommendations. These recommendations need to be clearly identified, mapped and tracked alongside the recommending process.

8. Data and contact persons need to be available and accessible during the research period.

In addition, our pre-selection review was inspired by the main pillars of Horizon 2020, namely Excellence, Societal Challenges, and Industrial Leadership. More than 50 cases were identified (see annex 10.1) each one corresponding to one of the three following areas:

a) Science, Technology and Innovation (related with Excellence pillar in H2020)
b) Global Challenges (related with Societal Challenges)
c) Enabling technology (related with Industrial Leadership)

The annex shows the candidate cases. They are characterised by the project name, geographical scope, area, field, launch year, future anticipation method, and sponsor. A sum of 28 pre-selected cases addressed STI issues (52%), 15 cases referred to Global challenges (29%) and 9 cases focused on aspects linked to Enabling technology (17%). The selection reflects how widely futures studies are used to provide STI intelligence. Especially at the European level, foresight is commonly utilised to address fields related to innovation.
policies, R&I systems, research infrastructures, R&I agenda setting, etc. Foresight is however applicable beyond STI. Many initiatives can be actually found across other socioeconomic areas and sectors (Popper, 2009). Global trends and sector development issues, for example, frequently demand the use of foresight and other future oriented methods.

The pre-selection exercise has predominantly chosen European-oriented projects. This is not exclusively due to the researcher’s personal preference, but also reflects data availability and accessibility. All the pre-selected projects also describe, to greater or lesser degree of detail, the future anticipation method utilised, which almost invariably represents a combination of different and complementary tools. In this respect, in the annex 10.1 we can find, per each pre-selected case, the methods that dominated the foresight process. The candidate cases were classified according to their grade of creativity, expertise, evidence and interaction (see Diagram 3 and annex 10.1).

**Diagram 3** A taxonomy of reviewed case studies

Diagram 3 shows (each case is identified by the code number listed in the annex 10.1) how foresight methods can be actually mapped by the combination of these four parameters. In
particular, it visualizes how the pre-selection process aimed to cover the whole parameters’ spectrum, while paying more attention to creativity-oriented projects (20 cases in the upper half of the diagram in contrast to the 9 cases placed in the lower half).

After completing the pre-selection process, selection of cases began. Firstly, only the European projects launched during the previous five years (i.e. from 2009 to 2014) were shortlisted. This resulted in the identification of 11 cases (see annex 10.2). Secondly, to capture the genuine contribution of future scenarios and compare them with other methodological alternatives, the cases were divided into two groups. The first group included those cases whose practical implementation did not assume the utilisation of scenarios. The second group presents those cases whose recommending process strongly relied on scenario-based methodologies (see annex 10.2).

Diagram 3 was then utilised to select, among these identified 11 cases, only those projects that have higher levels of creativity in their implemented methods (i.e. cases located in the upper half of the Diagram). Only one case from the first group (see case number 28 in annex 10.2) complied with this ‘upper half of the Diagram’ requirement. All the cases (number 4, 12, 13, 36, 41) included in the second group of annex 10.2 fulfilled the requirement.

“Visions for Horizon 2020” (Højgaard et al., 2012a, 2012b) was therefore the chosen case study (case number 28) from the first group. “Forward Visions on the European Research Area” (VERA) (Daimer et al., 2015) was finally the selected case (case number 13) among the five alternatives of the second group. Below we justify these selection decisions and introduce both cases, with their main characteristics being compared in Table 1.

- Why study “Visions for Horizon 2020”?

The goal of the Copenhagen Research Forum was to provide advice to Horizon 2020 to enhance research in Europe. It was the first time that European scientists, exclusively, without the participation of other stakeholders, were involved to provide a critical view of the European R&D agenda (Højgaard et al., 2012a, 2012b).

The foresight process consisted of a) a systematised future-based virtual discussion forum where 600 researchers commented on the Horizon 2020 final draft, b) six experts’ panels analysed the results, and c) a final conference endorsed the conclusions. It included six different sub-cases, corresponding to the societal challenges described in the initial draft of Horizon 2020 (EC, 2011b). One of these sub-cases would be studied in this thesis: “Inclusive, innovative and secure societies”, thus keeping similitude (in terms of research topic) with the second case study (VERA).

Horizon 2020 was especially inspired by the vision inherent in the Flagship initiatives of the Europe 2020 strategy (EC, 2010a), in favour of the 'Innovation Union' and the 'Digital Agenda for Europe', and the vision of ERA (Council of the European Union, 2008a). However, as for future visions, the methodology permitted that advisory panels could adapt these European visions to their own interpretation of the future (http://www.crf2012.org/).
“Visions for Horizon 2020” was located in the upper part of Diagram 3. It was the most recent case (2012) among those cases shortlisted in the first group of annex 10.2. This case reflects how an epistemic community may inform and scientifically persuade on the elaboration of forthcoming R&I funding agendas. The circumstances on which this project was conceived (imminent finalisation of the new R&I framework programme), the composition of the panels (elite scientists), and the structure of the advice discourse (policy recommendations embedded in a fully-argued narrative) provided a good opportunity to explore how policy advice discourses can be defended and transmitted in a highly political context, e.g. understanding to what extent advisors could incline advice towards specific perspectives or preferences. Thus the case would add a perspective of argumentation to the observations made in the second case, VERA, which mainly focus on the roots of the foresight process. In essence, the study would aim to learn how argumentation and persuasion are used in practice to articulate consistent foresight advice discourses. Both cases, V2020 and VERA, generated policy advice, i.e. reflect the ‘counselling function’ of foresight mentioned by Da Costa et al. (2008) and Eriksson & Weber (2008).

Unlike VERA, some restrictions were foreseen as for the transparency of the recommending process. The case only guaranteed the access to the methodological design (publically available though), interview with coordinators, and final reporting. Despite these process limitations, scrutinising a policy advice discourse of this sort through critical discourse analysis would certainly provide useful insights on the elaboration of foresight advice discourses. Other concerns to dissipate referred to the need of adopting a very objective and impartial position in the interpretation of the discourse and the subsequent analysis.

- Why study “Forward Visions on the European Research Area” (VERA)?

In 2012, The European Commission (FP7) founded a foresight project to provide strategic intelligence on the European Research Area by 2030 (Daimer et al., 2015). Initiated in 2000, the European Research Area was, after a long journey, scheduled for completion in 2014. In this context, the VERA project (http://eravisions.eu/) aimed to provide advice on the future of ERA, based on four exploratory scenarios.

Key aspects of the project included the special attention to the actor’s definition and selection, the utilisation of critical issues to challenge the plausibility of scenarios, the systematic elaboration of scenarios, and the highly structured design of the recommending process.

VERA mobilised a wide representation of European R&I stakeholders along seven different focus groups, thus covering a wide spectrum of ERA actors: society, academia, industry, research funders, leaders of ERA instruments, policy makers, and international stakeholders. The selection of participants considered several degrees of power, urgency and legitimacy, drawing on Mitchell’s stakeholder salience model.
Annex 10.2 shows that, within the second group of cases, only the INFU, RIF2030 and VERA projects addressed STI themes. INFU was principally oriented to innovation. VERA, in contrast to RIF2030, offered the opportunity of developing action research. In fact, the VERA project, in particular its recommending phase (led by the University of Manchester) started simultaneously to the case pre-selection process of this thesis. Action research on VERA\(^1\) would bring about much better availability and accessibility to data than other cases facilitating a permanent and open access to the project documentation. The project coordinator and tasks leaders were also fully available for interviewing.

VERA, at the moment that this thesis was being prepared, probably represented the most important ongoing European foresight project addressing R&I systemic problems, as it aimed to give advice for the future of the European Research Area. In this regard, a set of impactful recommendations was expected and welcomed by the sponsor (European Commission) so as to make better informed decisions on the targeted finalisation of ERA in 2014. There was, in sum, little doubt on the relevance and political visibility of VERA results across European R&I communities.

The analysis of VERA would provide a great opportunity for observing the mechanisms of foresight processes based on exploratory future scenarios. In Yin’s (2014) terms, VERA is a ‘critical case’ as it is a good representation of foresight theory and the findings could eventually expand this theory. The generation of VERA scenarios was led by Fraunhofer-ISI (Teufel et al, 2013). These scenarios became a key input for this research, without being relevant for this thesis to explore in-depth the process followed to build these scenarios. Our research questions actually called for a good understanding of the scenarios' final features, rather than exploring the scenario development process.

A very strong feature in favour of selecting VERA also referred to the recommending process design. As mentioned above, the process conceived the development of seven different stakeholders’ workshops. Each of these workshops would constitute a foresight project on its own, thus the research process (organization, implementation, development and analysis of results) would be reproduced in seven occasions. This replication potential would eventually add consistency and capacity of generalisation to the final findings.

Some potential limitations were also analysed in relation to VERA and the action research methodology. The utilisation of exploratory scenarios could hinder the generalisation of results to normative or ‘success’ scenarios. Another concern refers to maintaining the adequate distance required, in all action research processes, between the researcher and the object analysed, so that the researcher’s intervention will not eventually cause interference, or influence the results.

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\(^1\) The VERA action research process lasted for fifteen months, from January 2013 to March 2014.
Table 1 Comparison of the selected case studies

<table>
<thead>
<tr>
<th></th>
<th>Visions for Horizon 2020</th>
<th>VERA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Targeted problem</strong></td>
<td>R&amp;I to tackle societal challenges</td>
<td>R&amp;I system improvement</td>
</tr>
<tr>
<td><strong>Topic</strong></td>
<td>Horizon 2020 societal challenges (Inclusive and innovative societies)</td>
<td>European Research Area</td>
</tr>
<tr>
<td><strong>Rationale</strong></td>
<td>“To assess the European funding agenda addressing societal challenges and to face ERA priorities according to the Europe 2020 strategy” (Innovation Union flagship initiative)</td>
<td>“To provide relevant strategic intelligence for the future governance and priority-setting of the RTDI system in Europe and for better adapting STI policy to the shifting global environment and upcoming socio-economic challenges”</td>
</tr>
<tr>
<td><strong>Scope</strong></td>
<td>Europe</td>
<td>Europe</td>
</tr>
<tr>
<td><strong>Period</strong></td>
<td>2011</td>
<td>2012-2014</td>
</tr>
<tr>
<td><strong>Horizon</strong></td>
<td>2020</td>
<td>2030</td>
</tr>
<tr>
<td><strong>Political relevance</strong></td>
<td>Very high</td>
<td>Very high</td>
</tr>
<tr>
<td><strong>Urgency</strong></td>
<td>Very high</td>
<td>Medium</td>
</tr>
<tr>
<td><strong>Possibility of action research</strong></td>
<td>No (completed)</td>
<td>Yes (ongoing)</td>
</tr>
<tr>
<td><strong>Anticipating method</strong></td>
<td>Virtual forum, experts’ panels</td>
<td>Exploratory future scenarios</td>
</tr>
<tr>
<td><strong>Actors’ representation</strong></td>
<td>European elite scientists</td>
<td>European R&amp;I stakeholders</td>
</tr>
<tr>
<td><strong>Participation</strong></td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td><strong>Interaction</strong></td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td><strong>Empirical evidence</strong></td>
<td>Low-medium</td>
<td>Low-medium</td>
</tr>
</tbody>
</table>
3.5. Action research

3.5.1. Introduction to action research

Action research reflects a practical and scientific process that iteratively makes questions, plans actions, promotes reflection on research inquiries, seeks alternative actions and explanations, and monitors outcomes (McKernan, 1996). Key objectives are thus to observe, explicate, criticise, and transform social practices. Potential objects of inquiry include individuals, collectives, patterns, procedures, structures or behaviours.

Action research assumes that there are various ways of actively exploring these objects. The exploration implies to interact with people and acknowledge the subjectivity associated to the researcher’s observations (Ladkin, 2004).

Action research has a practical and participatory nature. It has also the capacity to generate evolving and evolutionary knowledge processes, and put this knowledge into action, thus developing its emancipatory potential (Reason & Bradbury, 2001). Now we briefly introduce the essence of action research through these two aspects or characteristics.

The practical aspect refers to its inherent problem-solving orientation, and in addition, to the benefits that the methodology brings on researchers’ own development. In fact, action research requires investigators to develop particular competences and skills, especially those related with interpreting, judging, and giving answers to uncertain and complex circumstances (Susman & Evered, 1978). Interacting and intervening on these processes are actually critical tasks that action researchers have to undertake in a self-conscious and strategic manner to avoid personal interferences in the outcomes.

The participatory character is reflected in the level of engagement that community actors normally have in such processes. Research collaboration with these actors actually favours data sense-making and facilitates a better understanding of problems and potential solutions. In action research, this understanding largely depends on ‘knowing through doing’ processes, which are fostered by actors’ practices exchange, deliberation and interpretation debates. Collaborative relationships are actually so intense that sometimes it is not easy to distinguish researcher from objects of inquiry (Reason & Bradbury, 2001).

The capacity to promote evolutionary knowledge processes refers both to the intellectual benefits that are obtained by participating in a case-study of everyday experience, and to the abilities to generate new knowledge that the process itself brings along.

The facility of action research to put knowledge into action is explained by the participation of multiple stakeholders. In this respect, it is important to note that action research is conducted with, for and by persons and communities (ibid.).

Finally, we have to highlight the emancipatory potential of action research, as it enlightens individuals and communities, turning them in agents of change that eventually may better overcome coercive or malfunctioning situations.
3.5.2. Action research as a natural reaction to positivism

‘Learning by doing’ conceptions of research (‘knowing through doing’) rely on researchers’ experiences and actions to explain reality, and take distance from rational (‘knowing through thinking’) or positivist approaches (ibid.). Susman and Evered (1978) suggested, in this regard, that action research may be a corrective for Positivism deficiencies. This claim is supported by the following action research characteristics:

a) **future orientation**: action research is usually conceived for dealing with human beings’ long-term practical problems

b) **collaboration**: action researchers and other system actors cooperate and are interdependent. Their ethics and values are recognised and identified aspects that guide the process and influence the assessment of research actions

c) **system development**: action research creates those communication and problem-solving structures that help to solve the research problem and create knowledge

d) **theory grounded in action**: theory is assumed to guide the course of actions. Then theory is revised and developed in the light of evaluation

e) **agnostic**: initial theoretical assumptions and actions often need to be reformulated during the research process. Objectives and problems are frequently generated and revised

f) **situational**: planned research actions depend on how actors define present context situations, e.g. studying the relationships between agents, events and things

The realist position assumed in this thesis, as stated in section 3.2, is epistemologically compatible with these characteristics of action research. This research actually complies with a) a future orientation, as the use of futures is at the heart of this research, b) collaboration, since the research work is intimately associated to the participatory dimension of foresight, c) a system development orientation, as reflected in the structure of analysis, which acknowledges the contribution of different actors’ views to solve the research problem, d) a theoretical baseline, as a conceptual frame connects the research assumptions and results, e) an agnostic perspective, as analytical strategies are redefined during the process to answer the research questions, and f) a situational orientation, related to the exercise of contextualisation developed in both case studies.

Positivist methods and action research actually represent very different research paradigms. Commenting on their differences is a good exercise to have a better notion of the nature of the method. We will follow Susman and Evered (1978) to describe and compare the following research aspects: values, time, relationships, the subject of inquiry, language, epistemological basis, knowledge generation, findings confirmation and generalisation.

With respect to values, while positivist methods are (purportedly) highly rational and value-neutral, action research (through people’s interaction) allows the observation and interpretation of a variety of actions and behaviours, most of which are laden with individuals’ personal preferences and concerns.
With regards to time, positivism normally only observes past, in contrast to action research, which interprets knowledge from the present and conceptualises futures.

If we analyse the relationships between both approaches we also find differences. In fact, action research fosters cooperation between inquiry system members (who are assumed to be self-reflective) and the researcher, in contrast with positivist approaches which consider inquiry units to be merely objects of investigation.

When we analyse the subject of inquiry we may realise that positivists consider case studies as just a representation of a wide population, whereas action researchers find case studies capable of providing sufficient valuable knowledge on their own to learn on the phenomena.

In this respect, we may find that while positivists use denotative and objective language in their research, action researchers show more connotations, implications, and subjectivity.

In relation to epistemology, positivists believe that knowledge is the result of prediction, has to be based on presumed propositions, and exists independently of human beings. Action research, on the contrary, develops theory from actions that are based on human purposes.

Consequently, positivists favour inductive and deductive generation of knowledge, unlike action researchers, who promote ‘knowing through doing’, thus modelling behaviours in a more constructivist manner. Heron (1992) assumes that action research generates experiential knowledge (obtained through people’s interaction), practical knowledge (obtained through practical intervention) and presentational knowledge (based on the analytical process that converts observations and experiences into models or patterns).

With regards to confirmation of research findings, positivism relies on rigid controls to assure the consistency of results. Action researchers, however, show more interest in assessing the consequences of planned and implemented actions.

Finally, it is important to note that both approaches understand the high influence of the research context, as it has strong implications for the generalisation of findings. Whereas positivist procedures try to seek a free-of-context generalisation of results, action research findings are dependent on the specific contextual situation, which generally leads to richer and more detailed explanations of phenomena.

### 3.5.3. Origins of action research

The term ‘action research’ was originally coined, in independent works, by John Collier and Kurt Lewin (Passmore, 2001), however, Lewin is broadly recognised as the initial precursor of action research.

Collier was a member of American Indian affairs between 1933 and 1945, and his work tried to improve race relations between whites and native Indians. He believed that conventional research, although being useful for producing interesting observations and insights, was not sufficient to deal with ethnic relations and tensions. In his opinion, only a participatory research, based on both communities dialoguing, would work to solve the problems (Lewin, 1946).
Lewin, meanwhile, began applying his ideas on participatory research during the Second World War, by experimenting and influencing the cooking habits of a group of housewives in relation to rationed food reduction. After the war, he contributed to changes in manufacturing productivity through action research methods and experiments that involved workers. He also inspired other followers in experimental psychology to investigate the influence of leadership styles on staff performance (Passmore, 2001). Lewin’s workshops fulfil three objectives of action, research and training “as a triangle that should be kept together for the sake of any of the corners” (Lewin, 1946. p. 42).

Almost in parallel, and influenced by its collaboration with a Lewin’s associated student, Eric Trist, the Tavistock Institute of Human Relations started to conduct action research in Britain on psychoanalysis and social disorders for repatriated prisoners of war. Another of the Tavistock’s major projects, not so oriented to therapy and medical application but to operational research and socio-technical systems, utilised action research to analyse the differences between high-productivity and low-productivity coal mines, trying to explain why Taylorism and job specialisation strategies offered a poor yield in that sector (Passmore, 2001).

Another pioneering stream of action research can be identified in the work of the US Society for Applied Anthropology. They proposed that both social and industrial problems be studied in cultural and sub-cultural terms (Rapoport, 1970). Elton Mayo’s experiments on working conditions and productivity, and other more recent works of the Harvard Business School, derive from this group (ibid.).

3.5.4. Definition and types

There is little agreement on the definition of action research. The term has been used and evolved within different areas of inquiry like education, management, organizational change and social theory (Ladkin, 2004).

Although there are numerous definitions, one frequently quoted (and discipline-independent) definition was suggested by Rapoport (1970, p. 499): “Action research aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework”.

Kemmis and McTaggart (1988, p. 5) understand action research as “a form of collective self-reflective enquiry undertaken by participants in social situations in order to improve the rationality and justice of their own social or educational practices, as well as their understanding of these practices and the situations in which these practices are carried out”. An interesting discussion can be found in Hult and Lennung (1980, p. 242). They present an exhaustive review and break-down of existing action research definitions, which give support to their own proposal: “Action research simultaneously assists in practical problem-solving and expands scientific knowledge, as well as enhances the competencies of the respective actors, being performed collaboratively in an immediate situation using data feedback in a
cyclical process aiming at an increased understanding of a given social situation, primarily applicable for the understanding of change processes in social systems and undertaken within a mutually acceptable ethical framework”.

The definitions presented above reveal different perspectives: pragmatic (e.g. ‘problematic situation’, ‘problem-solving’ references), knowledge-oriented (e.g. ‘expands scientific knowledge’, ‘understanding of a given social situation’ references) and socially transformative (e.g. ‘joint collaboration’, ‘change processes in social systems’, ‘mutually acceptable ethical framework’).

These perspectives are somehow reflected in the three forms of action research distinguished by Kemmis (2001), based on experiences in the field of educational action research:

a) technical or instrumental action research, which focuses more on outcomes and the incidence of actions than on the goals or the research process construction

b) practical action research, whose aspiration is not only to improve practices but also to acquire a profound understanding of the phenomenon and inform decisions. Action research as a self-education process for researchers, who become a subject of change

c) critical or emancipatory action research, that aims not only to reconstruct practices but also to question the practices setting itself and even the very research problem. Through collaboration and dialogue emancipatory action research tries to overcome conflictive or socially unsatisfactory situations

The practice of action research can also be analysed with regards to its field of action. According to Reason and Torbert (2001) we may distinguish:

a) first person action research: inquiry targets researcher’s own acts, thus bringing more reflexivity and awareness to his/her daily life activities

b) second person action research: inquiry addresses, with others, problems of mutual concern, thus promoting through interpersonal (face-to-face) dialogues

c) third person action research: inquiry into a broad community (e.g. geographical dispersion). This approach is less personal and requires more effective reporting of process and outcomes

3.5.5. The action research process

Action research reflects a process whereby theoretical assumptions are iteratively challenged in light of the observed practice. According to Winter (1996) this process is subject to the following principles:

1) principle of reflexive critique, whereby action researchers need to be aware of their biases

2) principle of dialectic critique, which urges action researchers to explore the relations between the phenomenon and the context, and to look for contradictions between the research case constitutive elements
3) principle of collaboration, that enables action researcher to challenge his/her own assumptions with the rest of participants’ points of view, thus reducing the risk of subjectivity

4) principle of risky disturbance, whereby the researcher must accept that his/her assumptions, decisions and anticipations are also objects of critique and change during the investigation

5) principle of plural structures, which suggest that researchers develop and deliver various reflexive accounts and interpretations of the problem, rather than a single answer, in line with the pluralist nature of the research process

6) principle of theory and practice internalisation, which highlights the interdependency and complementarity between theory and practice. Although at initial stages theory questions practice, during the action research process the observed practice challenges theory. This mutual controversy makes action research a powerful instrument for social research.

A pioneer description of the action research process cycle was proposed by Lewin (1946). Lewin’s ‘spiral of steps’ is composed of planning, action and fact-finding (based on the results of the action). Other well-known scheme utilised for describing the action research process was proposed by Susman and Evered (1978). It consists of six phases: development of a client-system infrastructure, diagnosing, action planning, action taking, evaluating, and specifying learning (see Diagram 4). The pivotal part of the cycle, development of a client-system infrastructure, includes probably the most critical aspects of the process insofar it establishes the conditions under which researchers will operate. This includes, among others, measures to avoid undesirable effects on the project or the organisation, to legitimate beneficial actions, and to delimitate the appropriation of new knowledge and findings (Baskerville & Wood-Harper, 1996).

Diagram 4 The action research process

Source: Susman and Evered (1978)
Diagnosing and evaluating phases require the collection of data. The selection of data and information gathering methods sometimes depends on the researcher’s background. For example, while psychologists often prefer questionnaires, psychoanalysts, anthropologists and socio-technical systems-oriented researchers normally choose direct observation and interviewing (Susman & Evered, 1978). Other methods used to collect data in action research are documentary analysis, diaries with personal insights, observations notes, memos, or tape recording.

Winter (1996) gives some practical guidance for action research fieldwork. Although some of the points are somewhat obvious, they need to be mentioned so as to get a better perception of the relevance of Susman and Evered’s client-system infrastructure. Winter suggests, for instance, that all relevant persons be informed first of the project objectives and guidelines. It is also desirable that all participants are allowed, in principle, to cooperate and interact with the process. In this regard, it is recommended that the research process will be visible enough to stimulate participants’ suggestions and to take into account a wider variety of ideas. As for privacy, it is important that action researchers ask permission for the consultation of documentation not directly related to the research problem. Winter also notes that the publication of practices and findings has to be negotiated, especially when referring to other persons’ work, as well as in terms of data and information confidentiality.

3.5.6. Tensions and difficulties

Despite its effectiveness to address social-technical problems and its capacity to generate knowledge, action research, in practice, gives rise to a number of difficulties and tensions. Winter (1996) succinctly outlines some practical concerns. One of them relates to the amount of resources needed to implement action research in organisations. He wonders whether the level of resources demanded actually compensates the results that otherwise could have been obtained with more mechanic and positivist procedures. It is well accepted that action research capacity for bringing together a variety of stakeholders’ perspectives and collecting multiple empirical data enables researchers to build much richer solutions than other methods. However, researchers need to be cautious to avoid that data richness will give rise to over-elaborated solutions leading to unfeasible or unsustainable actions. Over elaborated solutions and processes can make future replications by an organisation’s staff difficult, especially when the collaboration has finished and researchers’ capabilities are not so easily available.

Another risk associated to over-detailed solutions refers to the capacity of generalisation of results. Although generalisation may not be a priority for sponsor, it is a very important ambition for researchers. The abundance of organisation-specific data makes the application of findings to other cases difficult. We would also have important problems of generalisation if the opposite posture were adopted, i.e. the researcher opted for cases that have very limited data utilisation.
Ethical tensions sometimes emerge as a consequence of incompatibilities between the project/client mission and the researcher’s values (Rapoport 1970). In some cases, controversies arise over questions related, for example, to medical or psychological experiments or, especially in the private sector, to highly profit-oriented objectives. Confidentiality is required as for the tensions related to the treatment of private data. This applies both to individuals and organisations.

Goal tensions are often associated to the efforts to achieve the right balance between scientific development dedication (research) and an organisation’s demand for help (action) (ibid.). This balancing act frequently gives rise to controversies on researcher’s real dedication and time-related conflicts. Time aspects are especially critical as consistent research often takes more time than sponsors or clients expected. A common challenge for researchers involved in this sort of issues is to find ways of completing scientific work that, although being impactful for client and society in the long run, is not perceived useful by the client in the short term.

The demand of action research normally emerges from organisations that have pressures to solve certain socio-technical problems. In the Academy, however, research initiatives are usually linked to practitioners’ more flexible and reflective decisions, based on their own lines of investigation and trends within their specific discipline. To some extent, when organisations choose action research to investigate and solve a practical problem they are actually promoting a ‘reflection turn’ in management. As a result, new perspectives may lead researchers to question taken-for-granted objectives or the problem itself.

3.5.7. Dilemmas

The nature of action research implies undertaking successive ‘cycles of action and reflection’ (Ladkin, 2004) and brings about many types of knowing (Heron, 1992). Observing actors, interacting with them, and creating knowledge throughout these cycled processes configure a complex task that normally gives rise to some methodological dilemmas. Perhaps the two most important ones, both presented below, are those concerning the validity of the research conclusions in terms of subjectivity, and dilemmas related to the intense collaboration among actors that action research actually demands.

- One objection for action researchers is the difficulty of adopting a detached position with respect to the analysed object, that will permit them to discount the experimenter’ potential bias (Styhre et al, 2002). Recognising the extent to which potential biases can influence the results is, actually, the action researcher’s first step to keep neutrality in his/her personal interpretations. Given that action researchers take an active role in the process, assessing the validity of their findings or conclusions also requires to confirm that conclusions, at least, are enduring, practical, relational (collaborative), relevant (addressing significant issues), and explores various strategies for knowing (Reason & Bradbury, 2001). Given the concerns that action research generates in terms of subjectivity, communicating results requires high levels of transparency. This implies being precise and unambiguous in
both the description of the developed process and the choices made during this process to reach conclusions.

- Action research often induces researchers to collaboratively devise solutions of problems rather than observe, reflect and identify explanations of these problems. A very intense collaboration may in addition put into question the authoring of findings, as it is usually not clear the line between participation and intellectual ownership. Tackling this sort of problems demands action researchers’ leadership skills, so they can openly articulate propositions, reflections and perceptions while assuming that these ideas will be challenged by other actors’ interpretations.

3.6. Critical discourse analysis

Foresight advising is a difficult practice insofar as it needs to synthesise and interpret opinions in relation to a social practice in which several players, i.e. sponsors (normally policy makers), policy analysts or mediators, foresight facilitators, and participants themselves, interact. In fact, despite its increasing utilisation as an instrument of strategic intelligence, the efficacy of foresight to generate policy advice is often questioned. There are some barriers that can explain to some extent this lack of confidence.

- The substitution of observable facts by trends and future events usually constitutes an unstable foundation for scientific and rational argumentations. This is often seen as a primary obstacle for constructing relevant and practical for-today conclusions with foresight. Futures studies, in contrast to traditional science, are associated with high levels of plausibility and predictability of their claims (Schomberg et al, 2005).

- Another barrier that foresight usually finds when producing advice is related to the complexity of problems faced, e.g. providing solutions to system weaknesses defining research priorities, or orienting governments to address grand challenges. Due to multiple interconnections within complex systems, possible positive consequences of advice for one actor, for example, may ultimately be perceived negatively by other ones.

- A third barrier, related to the collective thinking processes that foresight facilitates, is consequence of actors’ participation. A high participation normally brings about complications for understanding and synthesising individuals’ ideas into collective reflections about how social systems actually behave and how they are likely to evolve. An added difficulty in this respect is given by the fact that participants’ insights not only emerge from the observable individuals’ interactions, but also from less obvious constellations of actors and preconceived agendas.

- A fourth obstacle refers to the risk of subjectivity inherent to the practice of policy advising. Despite efforts and predisposition for impartiality, the advisors’ perception of policy problems and their personal preferences are inherent to the advising process.

To diminish the effects that these barriers have on the credibility of foresight advice, foresight discourses have to emphasise the benefits of long-term oriented dialogues, demonstrate that
their conclusions are faithfully connected with the policy context and objectives, and transparently declare how the collective agreements and decisions were discussed, argued and challenged. Foresight discourses convey aspects of temporality (what images of future would emerge in the long term), structure (how systems may evolve) and agency (discussion of capacities and powers to induce change). They can foster strategic action and explain why people act in a specific way (Ramos, 2017).

An argumentative turn in foresight might thus support the practice of foresight, by empowering foresight practitioners with analytical, dialectical and logical instruments that contribute to build more consistent and articulated advice discourses, thus addressing more efficiently their ultimate objective, i.e. to influence the policy action and orientate governments throughout their decision-making processes.

### 3.6.1. Discourse as a subject of analysis

The study of argumentation is theoretically linked to the notion of discourse, and methodologically associated to critical discourse analysis (CDA). A definition of discourse is presented by Fairclough (1989) as ‘the whole process of social interaction of which text is just a part’. Social meanings are at the basis of discourses and consequently there is a relation between linguistics and social structures (Kress & Hodge, 1979). A poststructuralist perspective defines discourse ‘as a system of thought composed of different patterns of action, practices, ideas, beliefs, and attitudes that systematically construct the objects of which they speak’ (Foucault, 1972).

Although there are a range of analytical methods that explore how linguistics and sociological models interact within narratives (Titscher, et al., 2000), CDA is probably the one that most explicitly explores the connection between discourses, actor’s ideologies, perceptions and power.

The ‘critical’ side of CDA is dual, as it refers to both the rational self-reflective nature of sciences (Habermas, 1970), and the strong linkages that exist between linguistics and social structures (Halliday, 1978). As for the latter, Fairclough (1993) points out, based on Halliday’s functional-systemic linguistics, that texts and discourses are simultaneously socially constitutive and socially conditioned. Although far from being a homogeneous method, CDA provides a practical frame for organising and structuring qualitative research on those participatory processes that aim to give objective advice on uncertain and complex circumstances.

Fairclough (1993, 1995) suggests three levels of discourse analysis:

1. **Functional pragmatics**, for instance, relies on the power of language to explain actions between institutions and try to reconstruct actors’ motivations through the identification of structures and linguistic patterns (Ehlich & Rehbein, 1986). Narrative semiotics also aims to deductively identify deep structures of values and norms in text pieces (Greimas, 1987).

2. **Objective hermeneutics** is a very interpretative and non-linguistic method that assumes that texts and discourses have actually more hidden sense than the initially perceived, so the analysis has to identify latent structures and implicit interests (Oevermann et al, 1979).
- *description* is carried out at the textual level,
- *interpretation* is undertaken at the level of discourse, and
- *explanation* refers to the social practice in which the discourse is embedded.

Wodak’s discourse-historical method provides another scheme whereby, making use of an historical perspective, the analyst examines *contents, argumentation* and forms of *linguistic realisation* (Wodak, 1996).

Fischer and Forester (1993) proposed an *argumentative turn* in policy analysis. They suggest two levels of discourse examination, and four types of discourses:

- at the micro level the policy discourse analysis would be focused on:
  - *program verification* (technical-analytical discourse), and
  - *situational validation* (context analysis), thus making inquiries about actors, problems and policy programs

- at the macro level the discourse examination would include on:
  - *societal vindication* (systems discourse) and
  - *social choice* (ideological analysis), that principally pays attention to values and underlying principles.

### 3.6.2. Critical discourse analysis

Once we have introduced the notion of discourse, this section will focus on the potential of CDA to enhance the practice of policy advice analysis. The principal arguments are summarised in the following points:

- CDA makes explicit and pragmatic questions (Titscher et al, 2000) on the social practice. When evaluating participatory advice is therefore important to understand how actors’ representation and elicitation processes were designed to generate practical and sound advice.

- CDA aims to provide practical and multidisciplinary interpretations of social problems, thus enabling policy analysts to look at the problems from different perspectives.

- The study of the relations between power and the discourse, and the analysis of ideological interpretations are central objectives of CDA (Wodak, 1996; Fischer & Forester, 1993). Evaluating policy advice requires exploring these aspects in order to assess their real influence on the recommendations characteristics.

- Although CDA needs to be undertaken in close relation to the context, it still permits policy analysts and advisors take distance to allow observation. In contrast with other interpretative methods, e.g. objective hermeneutics, CDA aims to be independent of evaluator’ context conception and personal understanding.

According to Habermas (1970), rational thinking in discourses contributes to ‘overcome ideologically impaired discourses’. In the same vein, and given the practical nature of policy recommendations (which need to be simultaneously convincing, impartial, and efficient to
meet policy makers’ objectives) it may be useful to reinforce CDA, when analysing advice discourses, with some elements of practical and logical argumentation.

Fischer (2007) compares practical argumentation with formal logic. He states that practical argumentation is based on values and viewpoints rather than on formal logical axioms, and makes use of some logical inferences without being exhaustively deductive. It is focused on persuading the audience (e.g. policy makers), rather than convincing those with technical knowledge. As a matter of fact, practical argumentation does not aim for intellectual acceptance but to propose reasonable alternatives for action.

Practical argumentation or practical reasoning in CDA takes us back to the notion of accuracy or correctness, as described in 2.1.2. Correctness is probably the most important characteristic of recommendations, as it guarantees that the implementation of the recommended actions will surely solve the advisee’s problem. Ensuring correctness, i.e. reducing the possibility of error in advice, implies to reinforce problem-solving processes with pragmatic and convergent-thinking criteria. These criteria, complemented by the capacity of future based methodologies of producing divergent-thinking oriented solutions (as described in 2.3.3) makes foresight a strong instrument to generate sound, while creative, solutions to complex issues.

The reliability of statements supporting advice, and the validity of argumentation, are behind the concept of soundness. The relevance of soundness in the advising process motivates the discussion of the next section, which describes a notion of soundness that, underpinned by some practical assumptions, will provide a methodology allowing foresight facilitators and moderators to generate more consistent recommendations through pragmatic but flexible debates.

### 3.6.3. Practical reasoning and soundness

Unconsciously or intuitively, people utilise the concept of soundness to make daily and professional decisions. Policy makers, for example, demand sound solutions to address uncertain and complex problems. From a problem-solving perspective, soundness – the key characteristic of strong recommendations- and good reasoning – a mental process- are two of the most relevant aspects to pursue in the Advising practice.

Good reasoning is actually the process developed to generate sound advice. While ‘reasoning’ merely refers to the convergent-thinking process whereby a recommended action is justified, which does not imply that the action will be adequate to solve the problem, ‘good reasoning’ guarantees that the recommended action or emerging conclusion (underpinned by some assumed premises or statements) be effective in solving the problem addressed (Shand, 2000).
In general, to achieve soundness, practical reasoning processes have to rely on both true premises and a strength of logic that supports the conclusion derived from these premises\(^3\). A logically strong conclusion does not guarantee the truth of its premises, whereas a sound recommendation is at the same time logically strong and supported by true claims.

Applying the concept of soundness and practical reasoning to the generation of advice implies full understanding of the meaning of the supporting premises or statements in the context and system under study (to guarantee their truth or reliability), and of how these premises are actually utilised (i.e. checking the validity of argumentation).

The validity of argumentation belongs to the domain of formal logic. Logic is exclusively interested in detecting argumentation fallacies, rather than in analysing the truth of premises or their contents.

Based on these notions, sound advice needs to be understood as a set of recommended actions whose implementation, grounded on solid and reliable premises, could logically solve the addressed problem, thus presenting only a minimal possibility of error. Although evaluating reliability and logic argumentation looks, at least theoretically, to be a highly rigid and rigorous process, the influence of well-justified advisors' beliefs, experiences, habits or mental associations can make, in practice, the advising process much less deductive.

Given that the advice made with foresight is synthesised from many actors' reasoning processes and multiple insights, it is in practice extremely difficult to identify, for each individual recommendation, the supporting premises and the logical structure. One single premise or statement may be actually supporting multiple recommendations throughout the discourse; and vice versa, multiple premises along the discourse could be jointly supporting one single and simple conclusion. Furthermore, advice discourses (and foresight advice in particular) very frequently fail to explicate either the statements used to sustain the final recommendations, or the logic followed to arrive to one or another conclusion.

To overcome these practical and transparency-related difficulties, the evaluation of soundness needs to be twofold. Firstly, evidence of unreliability and argumentation fallacies have to be detected across the discourse. This will give us a preliminary estimation of the advice quality at the discourse level, without being specific in terms of single recommendations. Secondly, the evaluation requires, at the level of individual recommendation, a focus on four criteria: necessity, sufficiency, feasibility and irrefutability. Necessity and sufficiency conditions are sometimes used to define causal effects or testing the validity of definitions (Shand, 2000). The paragraphs below propose some aspects to be taken into account on each of these four criteria.

The literature (MacRae and Wilde, 1979; Linder and Peters, 1984; Yaniv & Milyavsky, 2007) recognises the importance of adopting policy decisions only after considering the whole set of evidence. As far as the truth of premises and the logical strength are not always easy to be proved or assessed (Hughes et al, 2010) prefer to use acceptability, relevance and adequacy of premises as three criteria of a sound argument.
of alternative actions. The concept of *necessity* is associated to the existence of these alternatives. Actually, we have a necessary recommendation when there are practically no more realistic options than the recommended action to meet the objectives. Yet we need to be aware that, since policy problems are highly complex, in practice fully necessary recommendations seldom exist. Similarly, wide and generic recommendations are often vague rather than necessary. Thus, it is important that policy analysts are able to differentiate between very generic suggestions and concrete and necessary advice. Other aspect that is worth mentioning refers to the possibility of making groups of recommendations or bundles, which can jointly make the advice more necessary.

Another soundness criteria to consider is related to the capacity or *sufficiency* of actions to solve the problem or satisfy the policy objectives. We can say that a recommendation has a high degree of sufficiency if it is able to meet the objective with practically no complementary or additional actions. Single actions are hardly ever capable of meeting the policy objectives in isolation, so they normally have to be grouped in order to augment their level of sufficiency.

*Feasibility* is perhaps the most intuitive and easily understood component of soundness, although, the clarity of the concept does not imply that its assessment is an easy task. In fact, the advisor needs exhaustive information about policy maker resources availability before deciding what advice should be proposed. Basu (1997) refers to the lack of feasibility as futile advice. An action is highly feasible if it is possible to be implemented by using the available resources (or at least with the resources that can be realistically obtained within a reasonable time period). It is also important to note that, in addition to time, material, and human resources availability, the analysis of feasibility must also observe the compatibility between recommended actions and the advisee’s values, perceptions or preferences.

The joint effect of necessity, sufficiency and feasibility constitutes a widely accepted theoretical approximation to sound advice. However, given the characteristics of policy advice, a complementary *irrefutability* condition completes the analysis. It is based on the practical reasoning approach suggested by Fairclough and Fairclough (2012) in relation to political discourses. Irrefutability means to deny that the suggested actions, despite targeting the objectives, may have any undesirable consequences for the advisee in other areas, i.e. confirm that the recommendations do not bring about negative technological, economic, political, social, environmental or ethical collateral effects. This is an issue already addressed in the literature (MacRae & Wilde, 1979; Linde & Peters, 1984, Simon, 1997) and usually overlooked in the advising practice.

### 3.6.4. An adaptation of critical discourse analysis for advice discourse

Based on the above examination of CDA, this section proposes a scheme for advice discourse analysis (ADA). It is conceptually based on the Fischer’s conception of practical argumentation. In the practice, the frame will use the three levels of analysis suggested by
Fairclough (1993, 1995), i.e. description, interpretation and explanation (Diagram 5). The model serves to analyse the characteristics of policy advice discourses.

The description layer identifies and characterises objectives and recommendations. It requires a previous mapping of recommendations throughout the text, including as far as possible explicit and implicit recommendations. The main themes or perspectives (topics) addressed during the discourse are then grouped and the alignment of recommendations with objectives is analysed. This layer is basically descriptive, and it aims to support the critical discussions developed in the next layers.

The interpretation layer examines how the advice was generated and delivered. In the case of foresight it means to analyse the use of futures, i.e. the participants’ relative position with respect to scenarios and visions, the methodology used to produce recommendations, the people that take part in the recommending process, and the way advice is argued, i.e. trying to analyse discourse weaknesses, reliability of statements, argumentation, utilisation of rhetoric elements, invalid justifications, etc. In particular, the reliability of premises and the validity of argumentation put the basis for the sound assessment included in the next layer.

The explanation layer focuses on the appropriateness or compatibility of advice in relation to the contextual (social, political, economic, etc.) circumstances. Assuming that the premises or statements used in the discourse are true, and that there are no argumentation fallacies (as explored in the previous layer), the level of soundness of the recommendations (necessity, sufficiency, feasibility and irrefutability) can be assessed either by the advice evaluator or by other external methods, e.g. interviewing or addressing questionnaires to relevant experts. Apart from providing a good perspective on the advice strength, the result of the soundness assessment is a subject of critical debate and can provide good material to reflect on which are the soundest recommendations. The explanation layer in addition includes a critical discussion on those context events, or factors related to the advice process itself, e.g. political urgency, available resources, dilemmas, institutional actors’ preferences, lobbying, etc., that may have had important influence on the final advice characteristics.

The three layers described in ADA jointly provide a comprehensive framework for analysing the outcomes of foresight, and for evaluating, in general, the quality of policy advice discourses. This is an important contribution since the importance of ensuring the quality and reliability of foresight recommendations has been a long-standing concern in the literature (e.g. Kuhlman et al., 1999).

This thesis includes a European case study, ‘Visions for Horizon 2020’, whose discourse was relevant in 2011 in relation to R&I funding policy decisions. Given the political urgency of the project and the interests of the actors participating in the advising process, the analysis of this case, presented in the next chapter, is structured with the ADA scheme described above.
Diagram 5 Overview of advice discourse analysis (ADA)

- **DESCRIPTION**
  - Objectives & recommendations

- **INTERPRETATION**
  - Recommending process analysis

- **EXPLANATION**
  - Sound assessment and critical analysis of contextual circumstances

Source: author’s elaboration
4. CASE 1: ‘VISIONS FOR HORIZON 2020’

4.1. Introduction

It is broadly recognised that Europe suffers a structural gap in the R&I system, compared with its main global competitors. The combination of many initiatives for the ERA development and the conclusion of FP7 financing period was intended to be a major opportunity for launching a R&I funding programme, Horizon 2020 (EU Framework Programme for Research and Innovation, for the period 2014-2020) that incorporated innovation as a critical strategy for growth. The three main pillars of H2020 (77028 M€) are Excellent Science, Industrial Leadership and Societal challenges. SMEs are likely to receive 20% of the total funds, which illustrates the interest of connecting R&D to the market. Other transversal issues are aiming to bring science and innovation close to society and promote citizen participation as a way of introducing and consolidating the concept of responsible research and innovation. Horizon 2020 priorities are articulated through numerous participatory initiatives (especially in research and higher education sectors, business sector and public administrations).

The European Research Area, which represents the paradigm of the European RTDI system building process since 2000, advocates the use of Horizon 2020 challenges as a way to drive and prioritise research efforts. In turn, Horizon 2020 was designed in line with the finalisation of ERA and its further consolidation.

In this context, during the Danish EU presidency in the first half of 2012, the Copenhagen Research Forum (CRF) carried out a review of the Horizon 2020 preliminary draft (EC, 2011b). The review was the baseline to offer a long-term critical perspective for the enhancement of the European research system and address societal challenges (Højgaard et al, 2012a, 2012b). It included the following six challenges: “Health, demographic change and wellbeing”, “Food security, sustainable agriculture, marine and maritime research and the bio-economy”, “Secure, clean and efficient energy, “Smart, green and integrated transport”, “Climate action, resource efficiency and raw materials”, and “Inclusive, innovative and secure societies”. It was the first time that EU involved exclusively the scientific community (600 individuals), with no participation of other types of stakeholder, to provide a critical view of the European R&D agenda (ibid.). The aim was to reach a consensus and joint position on societal challenges to be taken into account in the Horizon 2020 final formulation.

The project outcomes were presented in two reports (ibid.) and a website (http://www.crf2012.org). The first document (CRF I) analyses panels’ process and outcomes, whereas the second (CRF II) is a compendium of crosscutting findings related to the practical implementation of H2020. An interim document (which included an initial draft of preliminary recommendations) was also used to support the interview with the project coordinator during the thesis.
4.2. Advice description and characterisation

This section aims to answer the question ‘What is recommended in Visions for Horizon 2020?’ (see Diagram 5). The key purpose is to present the principal messages without addressing social or context explanations. This would situate the problem and potential solutions from a non-critical perspective. The analysis of Visions for Horizon 2020 (V2020) is based on the work done by the “Inclusive, innovative and secure Societies” panel. The overall objective of this challenge in the Horizon 2020 draft was to “foster inclusive, innovative and secure European societies in a context of unprecedented transformations and growing global interdependencies”. Its specific objectives, as stated in the draft (inclusive and innovative societies) and the number of recommendations generated by V2020 on every theme and subtheme are listed in Tables 2 and 3. V2020 list of recommendations are listed in the annex 10.3.1. The graphs illustrate how “Visions for H2020’ recommendations met these objectives and how different themes are addressed.

Table 2 Objectives coverage in ‘Visions for Horizon 2020’

<table>
<thead>
<tr>
<th>Recommendations (%) addressing each objective</th>
<th>Inclusive societies</th>
<th>Innovative societies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Promoting smart, sustainable and inclusive growth</td>
<td>24%</td>
<td></td>
</tr>
<tr>
<td>2 Building resilient and inclusive societies in Europe</td>
<td>16%</td>
<td></td>
</tr>
<tr>
<td>3 Strengthening Europe’s role as a global actor</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>4 Closing the research and innovation divide in Europe</td>
<td>16%</td>
<td></td>
</tr>
<tr>
<td>5 Strengthening the evidence base and support for the Innovation Union &amp; ERA</td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td>6 Exploring new forms of innovation and foster creativity</td>
<td>24%</td>
<td></td>
</tr>
<tr>
<td>7 Ensuring societal engagement in research and innovation</td>
<td>22%</td>
<td></td>
</tr>
<tr>
<td>8 Promoting coherent and effective cooperation with third countries</td>
<td>9%</td>
<td></td>
</tr>
</tbody>
</table>

*Note that in the final version of Horizon 2020, this societal challenge was renamed “Europe in a changing world - inclusive, innovative and reflective societies”, thus those aspects related to security societies were removed.*
Table 3 Recommendations of ‘Visions for Horizon 2020’ (by theme and subtheme)

<table>
<thead>
<tr>
<th>Theme</th>
<th>Subtheme</th>
<th>N. recs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge creation &amp; transfer</td>
<td>Social sciences &amp; humanities research</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Datasets in social research</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Collaborative research</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Knowledge transfer</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Open calls</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Research methodologies</td>
<td>1</td>
</tr>
<tr>
<td>Governance</td>
<td>Knowledge-based governance</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Simulation and benchmarking</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Stakeholders’ involvement</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Precision in social change diagnostics</td>
<td>2</td>
</tr>
<tr>
<td>Innovation</td>
<td>Demand led innovation</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Innovative innovation</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Knowledge-intensive entrepreneurship</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Open innovation</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Small scale innovation</td>
<td>1</td>
</tr>
<tr>
<td>Society engagement</td>
<td>Citizens participation</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Knowledgeable society</td>
<td>2</td>
</tr>
<tr>
<td>Global</td>
<td>Global discourses</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Global Constellations</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Global ERA</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>International analysis</td>
<td>1</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Academic institutions quality</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Excellence &amp; impact</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Multidisciplinarity</td>
<td>1</td>
</tr>
<tr>
<td>Regions</td>
<td>Regions inclusion</td>
<td>2</td>
</tr>
<tr>
<td>Equality</td>
<td>Gender &amp; minorities</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 2 shows that *Inclusive and innovative societies* have received similar attention from V2020 participants. “Promoting smart, sustainable and inclusive growth” and “Exploring new forms of innovation and foster creativity” were the most targeted objectives. “Promoting coherent and effective cooperation with third countries” is the objective where the panellists showed least interest.

Table 3 illustrates how recommendations can be clustered in themes and subthemes. Knowledge-related aspects were widely discussed, especially in relation to the role of Humanities and Social sciences. It is interesting to see how much attention was paid to the contribution of datasets and quantitative evidence to social research. This aspect is also present in the Governance cluster, in particular when proposing recommendations on ‘Simulation and benchmarking’ or ‘Precision in social change diagnostics’. V2020 also emphasises participation-related themes. In fact, the participation of citizens and other R&I actors is suggested by ‘Demand led innovation’, ‘Open innovation’, ‘Knowledgeable society’ and ‘Citizens participation’.

The ideas transmitted by V2020 recommendations can be summarised in a ‘big picture’:

a) knowledge generation processes may greatly benefit from new methodologies that incorporate innovative evidence-based methodologies

b) Governance has to be intensively supported by a knowledge base that includes comparative diagnosis of social problems

c) although innovation must be knowledge-intensive, it has to be open to a variety of stakeholders and citizens’ perspectives

d) society has to be empowered by education and knowledge, thus allowing a more effective participation in the policy debate

e) effective R&I policies should be based on a profound understanding of the way global actors position themselves to address global challenges, trying to unveil geo-political strategies in their international discourses

f) R&I needs to be multidisciplinary and its evaluation should find a good balance between excellence and impact.

4.3. Advising-process interpretation

In this section, the analysis of the advice discourse will try to explain ‘How were *Visions for Horizon 2020* recommendations generated?’ and to interpret how the recommending methodology may have affected the advice characteristics.

In 2012, two future visions for Europe coexisted: “Europe 2020: a European strategy for smart, sustainable and inclusive growth” (EC, 2010a) and “2020 vision for the European Research Area” (Council of the European Union, 2008a). The Horizon 2020 draft was particularly inspired by the Flagship initiatives of the Europe 2020 strategy in favour of the ‘Innovation Union’ and the ‘Digital Agenda for Europe’, and the vision of ERA.
In ‘Visions for H2020’ the discourse on “Inclusive, innovative and secure Societies” shares the vision of “a reinvented European welfare state in a globalising economy”. This is based on the assumption that the world is on a process of global reconfiguration. The crisis originated by the market powers has given rise to intense contestations by societal actors. In this context, V2020 participants were required to suggest strategies and policy recommendations that could be implemented today in order to achieve more inclusive, innovative and secure societies in Europe.

Due to the short time available to the project (the final version of Horizon 2020 was about to be released) the construction of future scenarios was discarded. Accordingly, the participants were not asked to think in terms of transformed future context as a baseline for the strategies, but uniquely think from the present and onwards. The panels were actually invited to freely explore how, from the present, inclusive, innovative and secure societies could develop into the future, thus redefining the ‘normative’ vision described in the Europe 2020 strategy. Therefore, recommendations freely emerged from panel’s own visions of the future.

On some occasions during the discourse references to undesirable potential scenarios are mentioned by the panel to reinforce their arguments in favour of their own visions. Challenging EC official scenarios with panels’ own visions may have some effects on the generation of policy recommendations. In the following sections the analysis of the discourse will be focused on the advice recommending process, trying to extract this type of lessons, i.e. learn about the influence of such a process in the advice characteristics.

The process will be analysed in relation to a) the methodology or procedure followed to generate the recommendations (What methodology was used?), b) the persons (advisors) who participate in the process (Who recommended, and finally, c) the way advice was argued and delivered to policy makers (How the advice was delivered?).

a) **What methodology was utilised to recommend?**

The “Visions for Horizon 2020” methodology consisted of a systematised future-based virtual discussion forum where 600 scientists (100 per societal challenge) individually commented on the Horizon 2020 final draft. We have already pointed out the importance that the participation of multiple advisors has for advice confidence (Budescu & Rantilla, 2000; Budescu et al., 2003). The scientists contributed with personal visions for the future, needs, priorities and potential solutions to EU challenges, taking as a basis for discussion the Horizon 2020 preliminary draft. In this respect, it is worth mentioning the effects of sharing the same kind of information to the participants in advice discussions: although it may be positive in principle to get participants better informed, it may also hinder the debate on individuals’ original ideas (Wittenbaum & Stasser, 1996). One important objective was to discuss the link between R&D and innovation. The forum provided inputs for six draft reports, i.e. one per Horizon 2020 societal challenge. The preparation of these reports was made in autumn 2011 by the panel chair and rapporteurs on each challenge. Diagram 6 describes the V2020 methodology.
Diagram 6 ‘Visions for Horizon 2020’ methodology

**Panel** | **Visions** | **Needs & solutions** | **Technologies & priorities** | **Instruments & implementation** | **Innovation impact**
---|---|---|---|---|---
1 | Draft 1.1 | 
2 | Draft 1.2 | 
3 | Draft 1.3 | 
4 | Draft 1.4 | 
5 | Draft 1.5 | 
6 | Draft 1.6 | 

**VIRTUAL DISCUSSION FORUM Oct-Nov 2011**
(6x100-600 scientists)

**CONFERENCE January 2012**
(6X15=90 scientists)

**Cross-cutting research issues**

**Visions**

<table>
<thead>
<tr>
<th>Visions</th>
<th>Needs &amp; solutions</th>
<th>Technologies &amp; priorities</th>
<th>Instruments &amp; implementation</th>
<th>Innovation impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Challenge 1</td>
<td>Draft 2.1</td>
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<tr>
<td>Challenge 2</td>
<td>Draft 2.2</td>
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<tr>
<td>Challenge 3</td>
<td>Draft 2.3</td>
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<tr>
<td>Challenge 4</td>
<td>Draft 2.4</td>
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<td></td>
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<tr>
<td>Challenge 5</td>
<td>Draft 2.5</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Challenge 6</td>
<td>Draft 2.6</td>
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</tbody>
</table>

**Cross-cutting framework conditions**

**Cross-cutting research issues (conference endorsement)**

<table>
<thead>
<tr>
<th>Visions</th>
<th>Needs &amp; solutions</th>
<th>Technologies &amp; priorities</th>
<th>Instruments &amp; implementation</th>
<th>Innovation impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Challenge 1</td>
<td>CRF report challenge 1</td>
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<tr>
<td>Challenge 2</td>
<td>CRF report challenge 2</td>
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<tr>
<td>Challenge 3</td>
<td>CRF report challenge 3</td>
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<tr>
<td>Challenge 4</td>
<td>CRF report challenge 4</td>
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<td>Challenge 5</td>
<td>CRF report challenge 5</td>
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<tr>
<td>Challenge 6</td>
<td>CRF report challenge 6</td>
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</tbody>
</table>

**Cross-cutting framework conditions (conference endorsement)**

**DRAFT(Conference background report)**

**CRF**
Copenhagen Research Forum report
Out of the 600 participants, 90 members (15 per societal challenge) formed six panels that discussed these drafts, analysing the recommendations collected for each challenge. The aim was to reach a consensus in the panel discussions, getting a joint position on grand challenges related recommendations and presenting options for their eventual implementation. In January 2012 they were invited to a one-day conference at the Technical University of Denmark to discuss the conclusions obtained.

Whereas the virtual forum facilitated individual reflection and high participation, the panels and conference discussions enabled collective thinking and deliberation on recommendations. The level of interaction and collective thinking was not homogeneous during the process, being significantly smaller during the virtual forum phase.

The project ran from November 2011 to January 2012. In this short amount of time the coordinating team managed to mobilise a large number of renowned scientists. The clarity of objectives and the interest in taking advantage of the political ‘momentum’ favoured the development of the project in a very short period of time.

By promoting this project, the Danish presidency aimed to inspire the European Commission on Horizon 2020 research priorities. This ambition to some extent explains some design aspects. For instance, establishing a virtual forum platform was a very pragmatic decision to save time while collecting a high volume of experts’ insights. In addition, asking participants to suggest and invite other recognised scientists and colleagues to the project facilitated an effective snowball effect. One decision that contributed to cluster ideas was to design a priori the structure of the drafts reports. This helped panellists to focus on CRF’s areas of interest, thus avoiding irrelevant experts’ discussions. Time restrictions also affected the way future anticipation was treated. In fact, instead of constructing futures scenarios ad hoc, each panel was allowed to foresee its own vision on its assigned societal challenge.

The conference did not bring interaction into the process, but rather served to validate panels’ work as well as to generate further advice. This collective validation raised the recommendations legitimacy.

b) Who recommended?

The participants of this project were considered elite scientists, and the selection criterion was their academic excellence. They were allocated to specialised groups to address specific societal challenges, thus ensuring an adequate level of expertise in each group.

The selection process adopted a networking approach, as every chair team suggested 100 participants, which to some extent ensured the invitees’ capability to talk on their assigned themes and warranted a strong academic orientation of the discussions.

The composition of the “Inclusive, innovative and secure Societies” panel reflects the efforts of the organisers to align participants’ expertise with the European inclusion, innovation and security objectives (see Table 4).
Each panel also included a policy officer from the European commission, which reflects Heath and Gonzalez (1995) and Schotter’s (2003) opinions on the participation of decision makers in advice discussion groups.

A brief analysis of actors was used to identify participants’ knowledge main domain (extracted from cv-bios), perceptions, and preferences. The identification of these attributes is based on a content analysis of the text (table 5 and 6).

In relation to the stakeholders’ salience model, the composition of the participants had a very strong academic legitimacy and an important component of urgency. The urgency aspect is explained by the imminent finalisation of Horizon 2020 and the real possibilities of ‘Visions for H2020’ to influence this final formulation. Although legitimacy and urgency could lead us to consider the group in the Mitchell’s category of “dependent” stakeholders, the incorporation of one member of the European Commission per societal challenge brought political power into the discussions, which gave panels a more “definitive stakeholder” character (Mitchell et al, 1997).

It is also interesting to observe that the sponsors (Capital Region of Denmark, Copenhagen Business School, Technical University of Denmark, and the University of Copenhagen) have similar legitimacy, power and urgency attributes. Some of these sponsors were actually participants, and given the similarity of sponsors’ interests with those of the wide scientific community, their participation would not influence, in principle, the objectivity of the results.

### Table 4 Participants’ knowledge domains

<table>
<thead>
<tr>
<th>Participants’ knowledge domains</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sociology and Philosophy</td>
</tr>
<tr>
<td>European democracy</td>
</tr>
<tr>
<td>Research and Innovation</td>
</tr>
<tr>
<td>European migration and integration</td>
</tr>
<tr>
<td>European governance</td>
</tr>
<tr>
<td>Science metrics</td>
</tr>
<tr>
<td>Creativity and psychology</td>
</tr>
<tr>
<td>Social and political security</td>
</tr>
</tbody>
</table>

### Table 5 Participants’ perceptions

<table>
<thead>
<tr>
<th>Participants’ perceptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>The world is in a process of <strong>structural change</strong></td>
</tr>
<tr>
<td><strong>Market powers</strong> are at the origins of the economic crisis</td>
</tr>
<tr>
<td>Contestation is arising as a consequence of <strong>inequality</strong></td>
</tr>
<tr>
<td>There is a weak understanding of the <strong>crisis origins</strong></td>
</tr>
<tr>
<td>The consequences of <strong>new global actors</strong> and powers emergence are yet to be analysed from a <strong>social perspective</strong></td>
</tr>
<tr>
<td><strong>Data analysis &amp; comparative studies</strong> are crucial to identify <strong>problem origins &amp; dynamics</strong></td>
</tr>
<tr>
<td><strong>Demand for knowledge</strong> has been rhetorically articulated by private industry, instead of being led by <strong>scientific rationales</strong></td>
</tr>
<tr>
<td>Participants’ preferences and values (as identified with content analysis)</td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>Knowledge-based governance</td>
</tr>
<tr>
<td>Democracy innovation and new forms of making Politics</td>
</tr>
<tr>
<td>Excellence</td>
</tr>
<tr>
<td>Increasing the role of <strong>Social sciences &amp; Humanities</strong> to understand social &amp; political problems</td>
</tr>
<tr>
<td>Inclusion and equality</td>
</tr>
<tr>
<td>International <strong>cooperation</strong> on excellence-based networks</td>
</tr>
<tr>
<td><strong>Epistemological pluralism</strong> in science to tackle grand challenges</td>
</tr>
</tbody>
</table>

The panel could have included experts in inclusion, innovation and security, in order to align the discussions with the ‘Inclusive, innovative and secure Societies’ societal challenge of Horizon 2020, and to enhance the credibility of resulting advice (Birnbaum & Stegner, 1979). However, the panellists were social scientists exclusively, so these three big topics were discussed only from a social research perspective. The presence of technology and engineering scientists, for example, would have avoided overlooking relevant insights related to synergies between technology and social innovation, or the contribution of new IT solutions to support European security.

This is also reflected in participants’ main perceptions (Table 5). In fact, throughout the whole discourse the participants have manifested, maybe with excessive emphasis, the potential of social sciences to explain the origin of crisis, world changes and inequalities.

In relation to preferences and values, the discourse reflects the importance for participants to have a more intensive participation of elite scientists in European governance. They noted that that knowledge should drive new democracy innovation processes. The text claims that this process should be lead and articulated by a network of social and humanities scientists that represented different epistemological conceptions of knowledge generation and its political application. The idea of bringing knowledge elites to the political spheres is frequently mentioned in the discourse, in contrast to references to citizens’ inclusion.

There are few references to early scientists and researchers (who, as a matter of fact, are the principal actors of future knowledge generation), and there is very limited mention of equality in Education and research careers inclusion.

The analysis of panel attributes, like perceptions, preferences, or values, suggests that the profile of the participants represented in panels can be a very important influencing factor on collective advising processes.

A particular panel representation could potentially permit the elicitation of ideas in one or other direction. There is a risk not only that specific topics or knowledge areas dominate final advice discourses, but also that attitudes and personal values, dominated by Simon’s ‘bounded rationality, permeate and give shape to the final advice argumentation.
c) How was the advice argued and delivered?

The transformation of participants’ insights, obtained through the virtual forum and endorsed by the experts’ conference, into readable policy advice was made by the panels’ chairs and rapporteurs. The CRF team reviewed the texts and conceived the structure and appearance of the final CRF I report.

The results of collective advice processes are normally dependent and affected by the intervention of the coordination team, which may bring subjectivity to the process. This explains why it is so important to analyse the use of argumentation and persuasiveness during the discourse, and why discourse analysis is proposed in this thesis as a tool to evaluate advising projects.

In order to analyse the discourse contained in the CRF I report, we will first analyse the advice structure, secondly the analysis will focus on the number of recommendations delivered, originality, perspectives and level of elaboration (which are the elements of divergent thinking as presented in the literature review), and finally the analysis will study some basic aspects of argumentation.

a. Reflections on advice structure

The CRF team provided to the panels an ad hoc structured frame for the report CRF I. According to this structure, the experts were invited to focus on very specific sections: Vision, Needs and solutions, Technologies and priorities, Instruments and implementation, and Innovation impact (Højgaard et al, 2012a). The team also published a complementary dossier CRF II, which summarises every specific Horizon 2020 implementation-related recommendations (Højgaard et al, 2012b).

In relation to the advice presentation, we note that the recommendations are not delivered in clusters, but instead they are scattered throughout all the sections of the report, thus constituting an inherent part of the discourse. A mapping process identifies and extracts key recommendations, as presented in annex 10.3.1. The narrative presents the recommendations explicitly (i.e. there are no hidden suggestions). It is worthy of note that the panels decided not to prioritise the recommendations.

As a final comment on structure, we observe that CRF panels preferred to assume a normative (‘should do’) approach, rather than adopting a preventive or defensive (‘should not do’) advice style. As referred in the literature review, this recalls the types of advice (Dalal and Bonaccio, 2010) suggested for ‘in favour of’ or ‘against’ advice alternatives.

b. Reflections on divergent thinking

As reviewed in the human intellect literature (Guilford, 1967; Weisburg, 1986; Paulus, 2000; Kincaid & Duffus, 2004) many studies on divergent thinking agree that the creativity of individuals is given by their capacity to produce a high volume of original and elaborated ideas, and their ability to observe problems from different perspectives. In fact, fluency, originality, flexibility of perspectives and elaboration are also important aspects of advice
discourses. The following paragraphs present a critical discussion on the way these aspects are reflected in the CRF’s advice.

In relation to the capacity of proposing numerous ideas, the project produced 55 different recommendations, despite the time limitation. The analysis shows very few repeated actions or redundancies. Table 7 illustrates how recommendations were distributed through the sections of the report:

**Table 7** Recommendations in ‘Visions for Horizon 2020’ per section

<table>
<thead>
<tr>
<th>Report section</th>
<th>Number of recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>2</td>
</tr>
<tr>
<td>Vision</td>
<td>14</td>
</tr>
<tr>
<td>Needs and solutions</td>
<td>13</td>
</tr>
<tr>
<td>Technologies &amp; priorities</td>
<td>6</td>
</tr>
<tr>
<td>Instruments &amp; implementation</td>
<td>14</td>
</tr>
<tr>
<td>Innovation impact</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total number of recommendations</strong></td>
<td><strong>55</strong></td>
</tr>
</tbody>
</table>

Assessing the originality of ideas in a participatory advice discourse is a difficult task unless you have full access to primary raw material and ideas elicited in the discussion panels. These primary ideas normally help to identify those messages reiteratively proposed by different participants, and also those ideas that, on the contrary, were mentioned only on very few occasions. Given that the foresight advice reports do not usually provide this sort of information, the originality of the CRF’s recommendations was assessed through external experts’ questionnaires (see annexes 10.3.2 and 10.3.3).

In this questionnaire a sample of 18 recommendations (one third of the total), that actually covers all the report sections, were presented to 13 selected stakeholders and experts on the European Research Area and the Horizon 2020 formulation conception process. They were asked to evaluate CRF recommendations in comparison with another related policy advice and similar European projects.

As illustrated in annex 10.3.3, the consulted experts assessed the originality of the project with a 2.5 mark, which gives us a rough idea on the novelty of the CRF recommendations. This mark actually qualifies CRF recommendations as only moderately creative or imaginative.

As for the diversity of perspectives, in Table 3 we can observe that the number of recommendations is quite different between themes and subthemes, social sciences and humanities research and database utilisation being the themes where participants showed
greater interest. Technology aspects were commented on in a very generic way as the profile of participants was more oriented to social sciences. However, economic related discussions connected to the social and political debate. There are no comments regarding environmental aspects, and the ethical aspects were only occasionally discussed, and referred to equality and human rights.

The heavy weighting towards social targets (most probably due to the participants’ interests) made the discourse insufficiently flexible in terms of perspectives. Thus European problems were almost exclusively tackled with a social focus in the discourse.

Finally, we will analyse the level of elaboration and precision of the recommendations. This can be assessed by studying the following aspects: who is involved in the suggested policy action (policy agents), what is suggested (advised action), how will the action be implemented (policy procedure), where will it be adopted (policy scope), why is it important (policy rationales), when will it be put in practice (implementation horizon).

In our case, policy agents and actors are identified only generically, and the level of detail of both suggested policy actions and their procedures is very low. There are actually no specific explanations on the manner in which recommendations could be implemented. As for scope, the recommended actions are suggested at European level, and although some of them are suggested at national and regional level, they are not sufficiently concrete. With regard to policy rationales, we note that the panel has frequently highlighted the importance of many recommendations by presenting ideological and political arguments, or by criticising existing structures. In relation with the implementation horizon, given the nature of the project, it was assumed that the recommendations could be adopted by the EC (i.e. included in the Horizon 2020 final version) almost immediately. Finally, also referring to time, it is remarkable that the discourse presents very few references to support or recover past policy actions. In this sense, the most mentioned past actions or policy decisions are those related to the financial crisis, and are strongly criticised.

c. Argumentation analysis

This section is based on the theory and practice of argumentation analysis. Drawing on the argumentation literature, the analysis of the discourse will consider the following aspects:

- reliability of the arguments and premises utilised in the discourse
- coherence of the discourse, from a logical and practical perspective
- validity of the discussion
- validity of the arguments used in the discourse
- utilisation of rhetorical elements.

Table 8 aims to serve as a guide for analysing the argumentation of the V2020 discourse, and for identifying possible inconsistencies.
<table>
<thead>
<tr>
<th>Table 8 Key aspects to evaluate in policy advice argumentation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Premises reliability</strong></td>
</tr>
<tr>
<td><strong>Logic &amp; pragmatic coherence</strong></td>
</tr>
<tr>
<td><strong>Practical coherency</strong></td>
</tr>
<tr>
<td><strong>Dialectical respect</strong></td>
</tr>
<tr>
<td><strong>Assumptions recognition</strong></td>
</tr>
<tr>
<td><strong>Straightness and non-evasiveness</strong></td>
</tr>
<tr>
<td><strong>Objectives respect</strong></td>
</tr>
<tr>
<td><strong>Absence of non-argumentative statements</strong></td>
</tr>
<tr>
<td><strong>Premises acceptation</strong></td>
</tr>
<tr>
<td><strong>Argumentation correctness</strong></td>
</tr>
<tr>
<td><strong>Clarity</strong></td>
</tr>
<tr>
<td><strong>Relevance of arguments</strong></td>
</tr>
<tr>
<td><strong>Exemplification</strong></td>
</tr>
<tr>
<td><strong>Endorsement</strong></td>
</tr>
<tr>
<td><strong>Use of rhetoric elements</strong></td>
</tr>
<tr>
<td><strong>Rhetoric acknowledgments of negative consequences</strong></td>
</tr>
<tr>
<td><strong>Rhetoric declaration of positive consequences</strong></td>
</tr>
<tr>
<td><strong>Rationalisation</strong></td>
</tr>
</tbody>
</table>
- Reliability
With regard to reliability, the first relevant aspect to be analysed is the level of verifiability of
the information and data presented in the report. There are some assumptions, like the one
that finds financial crisis and the transformative power of emerging technologies two global
aspects strongly affecting social development, which could be demonstrated (perhaps with a
significant level of difficulty). Other assertions, like the one that affirms that in the world there
is a new global reconfiguration of power, that could have been more clearly justified and
debated. Other affirmations like the necessity of handling crosscutting dynamics are very
vague and cannot be demonstrated.

- Coherence
As for logical and pragmatic coherence, the narrative does not present logic or pragmatic
contradictions between claims or with the policy context. Neither does the text present
contradictions or practical inconsistencies between recommended actions.

- Discussion validity
Some politically-oriented arguments are used to discredit past policy decisions. The
discussion is, however, dialectically valid, as the identified policy problems are not conveyed
by the advisors to another arguer or policy actor, i.e. there is not evidence of reversing the
burden-of-proof. It is remarkable that the narrative often introduces open problems with no
associated solutions, as a way to illustrate the wrong direction of current policies.

As for objectives, we can observe that, although a wide and clear objective is declared in the
introduction, many recommendations implicitly focus on different artificial objectives (‘straw’
objectives). These objectives are basically related to the ‘necessity’ of strengthening the role
of Social Sciences and Humanities (SSH) in tackling grand challenges, in particular
promoting the participation of top social scientists in Politics. Although in theory this
argumentation strategy is considered a fallacy, in this particular case it can be explained by
the pronounced social profile of the panel’s participants.

A final point regarding the discussion validity analysis, is that the discourse does not make
use of non-argumentative resources, e.g. recurring to emotions, etc

- Argumentation validity
One first comment on the argumentation validity refers to the actual capacity of CRF’s
participants to talk and provide advice on innovation. In fact, although the commonly
accepted premises on research policy and innovation are considered and respected in the
discourse, in general all the innovation-oriented assertions look like clichés and do not reveal
a profound understanding of innovation as an academic discipline.

Generally, arguments brought to the discussion were well elaborated. The utilisation of the
Arab Spring to justify the use of social research to solve political problems, or the
comparison between European diversity potential and the China technocratic regime are
useful and relevant, although they may have been more convincing if supported by further
argumentation.
The discourse neither presents illogical deductions nor major problems of clarity or ambiguity. However, very generic and vague references, e.g. an open and secure Europe can become a global hub in networks of newness, can be often found throughout the text. Finally, the analysis has not revealed the use of irrelevant arguments.

- Rhetorical persuasiveness

Very few rhetoric elements are used to reinforce the advice discourse. A minor one is the nomination of Social sciences as genuine, which may be considered a pretentious adjective if it is not well justified.

No self-criticisms (i.e. recognising the limitation of the advice) or collateral consequences acknowledgment are used to enhance arguments, which indicates to what extent ‘Visions for H2020’ has relied more on the strength of its arguments than on instruments of persuasion. There are, however, numerous declarations of the positive (direct and collateral) consequences of the recommended actions.

Evidence of political rationalisation was not found (i.e. to internalise and claim as valid something, despite its falsity). Nonetheless, the connections between inclusiveness, innovation and security are very forced, and look artificial in different parts of the discourse.

To end the analysis of rhetorical aspects, we note that the discourse makes use of other countries’ policy implementations (references to best practices) to convince the audience. This may have been utilised to compensate for the lack of explicit political or institutional endorsement (in fact, the Danish government’s political endorsement existed, though not explicitly). In relation to best practices and examples, there is a comparison with China on the way this country uses regions as policy learning policy labs (runs whole regions as tests), thus suggesting that the same could apply in Europe with obvious variations.

To summarise, Diagram 7 describes ‘How was the advice delivered?’ This Diagram is based on a personal assessment and rating of the advice discourse main components, and can be useful for policy analysts to compare different advice discourses.

Diagram 7 Visions for Horizon 2020: advice discourse profile
4.4. Advice explanation

In the following section the discourse analysis tries to answer, in relation to the V2020 recommendations, the question: ‘Why have these actions been recommended?’

The generation and implementation of policy advice depends on a variety of factors. Whereas some factors are rationally ‘soft’, others have an important rational weighting. Even those policy recommendations that are in principle not adequate or compatible with the socio-political environment could have at the same time an obvious logical strength. To take into account this point, we present below an evaluation of the advice soundness before making the critical analysis of the V2020 advice and its contextual circumstances.

**Soundness assessment**

Convergent thinking is an inherent aspect of decision-making processes. Given that policies usually have a critical impact on people’s life, policy advice needs to be to a large extent supported and justified by rational and sound reasons.

A sample of CRF recommendations has been subject to external experts’ assessment in order to have an objective idea of their level of soundness. Similarly, the analysis of originality described in the last section, the level of necessity, sufficiency, feasibility and irrefutability of the sample has been evaluated with a questionnaire (see complete questionnaire and detailed results in the annexes 10.3.2 and 10.3.3).

The analysis of the experts’ questionnaire answers confirms that the CRF recommendations have a moderately high level of necessity (scored 2.94, out of a maximum of 4) and there are very few alternative actions to address the objectives (‘strengthening the evidence base and support for the Innovation Union and ERA’, and ‘closing the research and innovation divide in Europe’).

The results also show that the recommended actions have a moderately low level of sufficiency to meet the objectives. According to consulted experts, the recommendations could only achieve the mentioned objectives if they were accompanied by some additional resources or complementary initiatives (score 2.38 over a maximum of 4).

In relation to feasibility, the questionnaire scores show that, in general, CRF recommended actions are feasible (scored 2.90 over a maximum of 4). According to experts, only a moderate incorporation of new resources or instruments is needed to implement the suggested actions.

Finally, experts did not find many negative collateral effects on the potential implementation of CRF advice (scored 3.05 out of a maximum of 4). In this sense, CRF recommendations have a moderately high level of irrefutability.

**Linking CRF’s advice with the context and the social practice**

Explaining the rationales behind the V2020 participatory advice discourse requires understanding actors and participants’ behaviour in relation to the political momentum, their
main assumptions, and those overarching messages that participants found important to transmit to the audience based on the context circumstances.

a) Reflections on the political momentum

The Copenhagen Research Forum members are the University of Copenhagen, the DTU – Technical University of Denmark, the CBS - Copenhagen Business School, and the Capital Region of Denmark. Whereas three members are strictly academic, the Capital Region of Denmark is a public authority devoted to health services. The relevance of the project needs to be understood in relation to the Horizon 2020 time agenda.

The Danish EU presidency coincided with the period during which the final version of Horizon 2020 was being formulated (Brenneche & Højgaard, 2012). Following Kingdom’s (1995) terminology, this constituted a ‘window of opportunity’ to inform the EC on the upcoming research funding agenda. Diagram 8 describes timing and key activities.

Diagram 8  Visions for horizon 2020’ time plan

When the project was conceived, Europe was immersed in a period of important financial and economic turbulences. This problem is iteratively mentioned throughout the discourse. Economic reasons are closely connected to the social and political debate, somehow reflecting a political position and with emphasis on existing political and social divergences.

As the political momentum was increasing the probability that some of the CRF conclusions could certainly be heard and taken into account by the EC in the short term, the recommendations were conceived as to be immediately implemented. However, and despite this urgency, the transformation (strengthening) of the European RTDI system was expected to be gradual.

b) Main assumptions

The analysis of the discourse has allowed the identification of participants’ main assumptions. Although sometimes these assumptions are not explicitly presented, they serve to justify most of the final CRF advice. These assumptions represent participants’
specific perceptions on societal problems and give us some indications on their preferences and orientations:

- **Assumptions on the welfare state:** according to the panel, the European growth model is not sustainable, thus a welfare reinvention is needed, being supported by disciplines like economic history, comparative institutionalism or macro-sociology. It recognises, nonetheless, that reforms of this type will inevitably produce collateral damages ('winners and losers on a grand scale').

- **Assumptions on Politics and governance:** the panel finds participation, legitimacy, contestation and collective governance as the logical components of Politics. A high mistrust of political institutions is reflected in many sections of the discourse, with recurring references to the financial crisis. The relation between knowledge and democracy is also discussed to emphasise the importance of relying more intensively on social scientists to support the political action.

- **Assumptions on the alliance of the policy spheres and Academia:** policy makers and Academia’s different roles and rationales are not yet clearly oriented to create synergies and promote collaboration. These actors could challenge more actively each other’s conclusions so as to optimise the benefits of their mutual understanding.

- **On the democratisation of the innovation demand:** creativity, rather than optimisation, drives innovation actions in the knowledge-based economy. A democratisation of the innovation demand would help to capture the imagination of medium or small players.

These messages situate the European growth model and the existing forms of making Politics as the main reasons for the European welfare stagnation. The analysis of the discourse provides some messages that can be considered possible solutions to this problem.

The first solution is technical/practical and consists of the utilisation of open calls, foresight and other instruments to give voice to research in policy formulation. This formulation needs to be supported by a European data strategy that relies much more intensively on the utilisation of datasets. This specific orientation to datasets is very much aligned with some participants’ specific areas of specialisation.

The second solution is more political than practical, and presents an unambiguous and legitimate interest of panellists to influence the policy action. However, an active participation of elite scientists in policy making could have been better argued and advocated in the discourse if it had been supported with figures and statistics obtained from the virtual forum. While an exclusive incorporation of (elite) excellent academics in policy making is suggested for the definition of European research policies, in parallel the panel believes that innovation decisions have to be much more open and democratic. Regardless the importance of openness in innovation this suggestion is questionable insofar as it was widely accepted that the formulation of research and innovation policies deserves to be complemented by both excellence-oriented (elites) and open (public) approaches.
The elitist representation of the panel and the capacity of influence that the report could eventually have influenced, due to the political momentum, the panels' ideas orientation.

c) Overarching messages

The recommendations included in the CRF I report are listed in the annex 10.3.1 and are characterised in the first part of this ADA analysis. The analysis of these specific recommendations and the discourse articulated around them permit the identification of three overarching messages.

The first message refers to the necessity of reinforcing the role of SSH to make possible the development of knowledge-intensive governance. The second message highlights the benefits of excellence and interdisciplinary research to address global challenges. The third message makes claims for a more innovative conception of innovation.

In the following paragraphs these three main messages are analysed. The discussion is enriched with some selected recommendations literally extracted from the text to illustrate the ideas. To make this selection more rigorous the extracted examples represent some of the soundest CRF recommendations (based on the experts' questionnaire of annex 10.3.2).

A. Reinforcing the role of Social Sciences and Humanities

At the beginning of the report the Societies’ panel shares a vision “of a reinvented European welfare state in a globalising learning economy. This requires Europe to position itself as a leader in promoting inclusiveness in numerous aspects of daily life, bringing innovation from the laboratory to society worldwide. As a result, Europe should work towards becoming a truly knowledge-based economy, cultivated by a creative attitude” (Højgaard et al., 2012a, p. 75). This vision reflects some assumptions commented on in the previous sections, e.g. welfare state reinvention or the relevance of a more openly conceived innovation.

In relation to this vision, Social Sciences and Humanities could adopt a dual function, either supporting the other sciences, or alternatively, developing a specific role of their own to provide solutions to social and political problems.

They assume that the relevance of social sciences can be enhanced by constructing alliances between Politics and Academia, which would make “politics knowledgeable and knowledge responsive and responsible” (ibid. p. 79). The benefits of connecting these fields are declared as “Societal challenges research often happens at the intersection of policy-oriented expertise and academic knowledge anchored in university departments. If the distinct social roles and internal dynamics of these communities are recognised – and mutually respected – it is possible to optimise procedures, deliverables, and funding regimes for the purpose of getting the two communities to challenge each other in helpful ways” (ibid. p. 81). In this message the participants refer to respectfulness as a value that would eventually help to situate themselves at the same level of authority and responsibility as politicians. In particular, in the discourse they describe social sciences as a useful science for sense-making, which may help policy makers to avoid their policies bringing about negative or unintended effects.
The circumstances that Europe was living at the end of 2011 (immersed in a profound economic crisis) also have reinforced those messages claiming for the introduction of innovative forms of governance and new policy making schemes. In this sense, the panellists strongly suggested that these new forms also be led by social sciences. However, more open reflections could have shown the potential linkages and synergies between social sciences and other hard sciences to address global issues.

Not only the participants’ aptitude (clearly dominated by social sciences and humanities disciplines) explains the intensity of their messages, but also the panellists’ interest in and attitude toward participating more actively in a more knowledge-intensive European governance (i.e. to have their interests heard in Politics) actually explain the sense and tone of many of their recommendations.

The influence of participants’ preferences is also observable when we look at their knowledge specialisation or domain (see Table 4). For example, regarding the inclusion of specialists in science metrics in the panel, these have surely contributed to the relatively high number of recommendations that explicitly suggested a more rational, systematic and precise use of datasets to understand the transformation of the European societies. This influence leads us to assume that the panel representation design can effectively affect the characteristic of the final advice. In other words, the importance of data metrics in the discourse would have most probably been overlooked if panel composition had been designed differently.

B. Excellence and interdisciplinary research to address global challenges

The importance of looking for excellence when making funding decisions, and the relevance of interdisciplinary research are two underlying aspects of ‘Visions for H2020’ advice discourse. Based on the analysis of recommendations, some critical considerations can be mentioned in relation to both aspects.

As for excellence, the reader may find it difficult to conjugate a discourse that relies very much on the participation of scientific elites (who somehow represent the paradigm of excellence and exclusivity) with the necessity, also expressed by the panel, of taking into account the voice of society for defining grand challenges. In fact, the analysis of recommendations shows that the participation of citizens in science is only moderately advocated, in contrast with the strong interest in elite scientists’ participation. The specific focus on “Inclusive, innovative and secure societies”, which the panel discussed, could actually have been a great opportunity to include the vision of citizens into the advisory group.

The analysis also reveals little attention to research careers issues. Improving researchers’ resources and reinforcing researchers’ careers are actually at the basis of academic and scientific excellence. Given the academic background of the panel and its compromise with academic distinction, a more significant number of recommendations addressing researchers’ careers problems could be expected.
Similar arguments can be made regarding interdisciplinary aspects. Although interdisciplinary research is strongly suggested by panellists to target societal challenges, the final discourse has a very pronounced bias on social sciences in comparison with other sorts of disciplines. In addition, the discourse does not place sufficient emphasis on the capacity of international networks to promote interdisciplinary research and diversity, especially in a moment when the real global dimension of ERA is debated. Given the global character of grand challenges, the panels should have represented the perspective of international (non-European) actors, as a way to reinforce and endorse those messages related to the relevance of global cooperation and interdisciplinary networks of excellence.

C. Innovative innovation

The panel believes there is a risk that innovation will become a static “slogan”, or a concept adaptable to different and changing environments. This wake-up call was used by the group to warn of the necessity to promote a better understanding of innovation, (with the support of social sciences) and on the importance of being innovative about innovation. A better understanding of innovation would imply, for example, the embedding of social scientists in processes that aim to innovate in democracy and in the definition of new forms of knowledge-based governance. Based on their assumption that creativity drive the innovation actions in the knowledge-based economy, a democratisation of the innovation demand was also recommended. This is partially illustrated by the assertion “Innovation should be achieved by embedding the ‘problem definition’ with societal actors, citizens, and communities – not limited to the top-down agendas of policy makers and business elites.” ([Højgaard et al., 2012a, p. 78].

The analysis of the discourse also reveals an interesting difference in the conception of participation. Whereas the panel advocates the active participation of a variety of stakeholders in innovation processes, a wide participation of these actors in policy making processes is not so intensively defended. In fact, CRF’s recommendations about the latter are found to be more restrictive and conditional than those suggestions referring to the former. To some extent, the discourse transmits the idea that only elite scientists can effectively support policy makers to improve European governance.

Another important aspect worthy of comment is the linkage between industry and academia to promote innovation. The analysis of the discourse reflects that this linkage has not received the same level of attention than the linkages connecting Government with Academia. The panel, however, discussed the benefits of ‘triple helix’ to stimulate innovation. Interestingly, the analysis of participants’ curricula confirmed that this topic corresponded to the area of expertise of one participant, who actually was the author of the concept.

All in all, the discourse on innovation has brought to the debate two interesting perspectives. On the one hand, the panel invited to design a challenging innovation agenda that requires a more intense involvement of social sciences, somehow failing to specify the sort of innovation that could be preferably pursued. On the other hand, calling for ‘innovating in
innovation’ can be understood perhaps as a weak signal that some innovation concepts are becoming rapidly obsolete, and that Europe needs to adapt to a new situation in which those actors being able to interpret the big picture will eventually be indispensable.

4.5. Conclusions on the discourse analysis: methodological implications

This chapter has illustrated how discourse analysis can be adapted for assessing policy advice discourses (ADA). Recognising with critical discourse analysis how advice is developed, presented and argued is important not only from an ex-post perspective, contributing for example to reinforcing the practice of foresight traditional evaluation, but also from the point of view of who is actually involved in the process of developing such advice. In fact, aspects related with advice soundness or practical argumentation enable foresight practitioners to generate more convincingly argued recommendations, provide more consistent and structured outcomes, and get a more solid coherence between project, actors and the context.

We will comment below on three lessons for the practice of foresight that can be extracted from the discourse analysis of ‘Visions for Horizon 2020’.

- One lesson refers to the influence of panel’s representation. The case study suggests that the composition of panels affects the perspective from which problem and solutions are treated, especially when the panel is not balanced in terms of participants’ perceptions and preferences. In our case, for example, the panellists’ strong values of excellence and academic exclusiveness have clearly penetrated the discourse. On some occasions, it is not obvious (or at least the discourse fails to make it sufficiently clear) whether the implementation of advice would eventually have a positive impact on the R&I system or merely benefit the scientific community itself. The extent to which this representation effect can interfere with the neutrality of policy advice is something that requires further research.

- A second lesson relates to the importance of advice argumentation. Like any ex-post assessment, the analysis of CRF’s discourse started with the results, i.e. with the final report that integrates all the participants’ insights into a single discourse. This analysis was considered crucial in the research methodology to understand how foresight outcomes can be presented and argued. The discourse analysis has proved very positive to observe the efforts of advisors to enhance the persuasiveness of their recommendations, to learn the importance of reliability and rhetoric aspects throughout the narrative, and even more importantly, to emphasise the convenience with which foresight practitioners may utilise the references for policy advice argumentation (table 8) as a guide for an easier and more systematic justification of foresight results.

- A third conclusion stresses the relevance that soundness has in the practice of policy advising. The analysis described in this chapter suggests that rational aspects like necessity, sufficiency, feasibility and irrefutability need to be considered not only in foresight advice evaluation, but also during the foresight elicitation process itself. In fact,
foresight elicitation activities may include the possibility that participants will check that their ideas are not only imaginative but also practical and reasonable.

Although ‘Visions for Horizon 2020’ has facilitated necessary reflections on important foresight aspects like the panels’ representation, advice argumentation, and soundness, which are crucial for understanding the generation of advice, the analysis has had only a limited capacity to observe and analyse in depth the anticipatory and recommending parts of the foresight process. In fact, given that the discourse analysis was focused on an ex-post evaluation of results, rather than on the advice process itself, it is reasonable that this process be explored with another complementary foresight case study.

The VERA project coincided with this thesis in terms of timing. The accessibility to VERA data, together with its political relevance and visibility, constituted very valuable conditions to select, in 2012, VERA as the case study that would provide a thorough view of the foresight process. Given that the University of Manchester was leading the recommending phase of the VERA project, the analysis of the process took the form of action research.
5. CASE 2: “FORWARD VISIONS ON THE EUROPEAN RESEARCH AREA”

The study of the VERA project aims to understand how foresight can produce participatory and potentially transformative advice based on future scenarios. The objective of this chapter is to describe and analyse the foresight recommending process developed during this project.

Among other specific objectives, VERA has served to propose the transformation of the European Commission’s current five ERA priorities into nine new ERA evolving dimensions. This proposal could eventually have impact on forthcoming ERA related policies.

Similar to the literature review structure, the analysis in the chapter draws on Miles’ fully-fledged foresight dimensions (Miles, 2008), i.e. prospective, participatory and policy/practical aspects. The analysis explores and expands these theoretical aspects from the recommending phase perspective, paying special attention to the contribution of scenarios and actors to policy advice generation. The connection between future scenarios and the generated advice is considered to be a black box, a gap in the foresight literature. In contrast to many other foresight projects, VERA allowed us to observe this gap, since it reflects a foresight process where the anticipatory and the recommending phases were transparently connected and documented.

The analysis of the prospective aspect presents a comprehensive study of the capacity of future scenarios to influence the characteristics of the generated recommendations. The analysis of participation will try to reflect the influence of R&I actors in the type of perspectives addressed. Finally, the analysis of the policy/practical side of foresight describes the elicitation and argumentation processes, which include an innovative polygonal frame and a new bundling approach. It is likely that this was the first time these approaches, which were conceived and explained in this thesis and implemented in VERA, were used to elaborate advice with foresight. All the VERA final recommendations were clustered and articulated around the polygonal nine dimensions in the ERA Open advice report (Popper et al, 2015).

The chapter is structured accordingly, the first part describes the evolution of the ERA priorities. An historical introduction of ERA from the perspective of R&I priorities is very important to understand the relevance of the VERA nine new suggested dimensions. The second part briefly presents the VERA project. The third part describes the VERA recommending process, i.e. presenting the procedure that gave rise to the VERA recommended actions. The fourth, fifth and sixth parts represent, respectively, an in-depth analysis (above mentioned) of the prospective, participatory and practical aspects of foresight, drawing on Miles’ conception of fully-fledged foresight. Finally, the last section summarises the VERA action research key findings.
5.1. The evolution of the ERA priorities

Although the construction of a European Research Area (ERA) was officially launched in 2000, within the Lisbon Agenda, the idea of integrating European countries’ research efforts has a long history.

The creation of common structures for technological investigation within the Treaty of European Coal and Steel Community (ECSC) (1951), was the first and most important expression of European research collaboration. Through the fifties, the creation of CERN (1954) and the signing of the EUROATOM Treaty (1957) confirmed research collaboration on nuclear Physics and nuclear Energy as key priorities for European economic recovery. The Joint Research Centre (JRC) was created at that time (1959) to make Euroatom more operational. The Treaty of Rome (1957) marked the start of the European Economic Community (EEC), with a strong economic orientation and only a moderate attention to research. During the following years, research gradually increases its relevance, principally through the Cooperation in Science and Technology (COST) and the Committee for Scientific and Technical Research (CREST), who promoted a more coordinated scientific action of the Member States. Common research priorities and structural recommendations were developed and, for the first time, foresight began to be utilised in research policies (Tindemans, 2009). The coordination of research actions acquired an applied and industrial dimension in the eighties with the European Strategic Programme for R&D in Information Technology (ESPRIT) and the EUREKA programme, which had a wider participation of companies. The European Science Foundation (ESF), created in 1974, with minimal resources, was the academic response to the industrial orientation of European research and constituted the first European networks of basic research.

Inspired by the ESPRIT and Euroatom programmes, the EEC established the first R&D Framework Programme (FP) in 1984, which gradually became a key pillar of European research cooperation (ibid.). The first experiences with FP, the recognised success of CERN and Euroatom initiatives, as well as the pressure to replicate experiences like ESPRIT in other fields, meant European research collaboration became seen as essential for Europe economic development.

In the late nineties other factors confirmed the necessity of collaboration. Emergent economies like China and Korea were increasingly considered a threat to the European economy, especially due to the fragmentation of the European research landscape. In this context, Europe also needed to implement catch-up processes, given that the US and Japan were showing better R&D performance. Some figures are presented in the communication “Towards a European Research Area” (EC, 2000) to summarise the concerns:

- the research effort was only 1.8% of Europe’s GDP, 2.8% in the US and 2.9% in Japan
- the difference of total research expenditures of US and Europe was 60 billion € in 1998, and 12 billion in 1992, so the difference was increasing significantly
- researchers were only 2.5% of the industrial workforce in EU, 6.7% in US and 6% in Japan
- high tech products trade was showing a deficit of 20 billion € per year in Europe over the past ten years
- degree-level European students in the US is double the number of US students in Europe
- 50% of European PhD students in the US remain there for long time

This unfavourable context explains why Europe decided to establish the basis for a knowledge-based economy. The construction of a European Research Area was actually one of the most important components of the new Lisbon Strategy. The initiative belonged to the Commissioner Philippe Busquin, and to a large extent was based on the ideas of his predecessors R. Dahrendorf, who in 1973 proposed to ‘harmonise national procedures relating to decisions onconcerting R&D budget decisions’ (EC, 1974), and A. Ruberti, who in 1993 claimed that Europe should go from a ‘simple juxtaposition’ of national programs towards a ‘truly European research policy’ (Banchof, 2003). ERA in 2000 was differing from other previous initiatives of coordination in considering knowledge, science and technology in close relation to citizens, thus prioritising action over the mere identification of problems (Caswill, 2003). The Open Method of Coordination (OMC) was also defined in the Strategy as an instrument of governance that establishes guidelines and indicators based on countries’ targets, peer reviews and evaluations in order to promote Member States mutual learning on national policy making. The objectives below illustrate how ERA was conceived in the Lisbon Strategy:

1. A stock of material resources and facilities optimised at the European level
This objective includes ‘networking of centres of excellence and creation of virtual centres’, a ‘definition of a European approach to research infrastructures’, and a ‘better use of the potential offered by electronic networks’

2. More coherent use of public instruments and resources
Meaning a ‘more co-ordinated implementation of national and European research programmes’, and ‘closer relations between European organisations for scientific and technological co-operation’

3. More dynamic private investment
It may be achieved through a ‘better use of instruments or indirect support to research’, the ‘development of effective tools to protect intellectual property’, and the ‘encouragement of the creation of companies and risk capital investment’

4. A common system of scientific and technical reference for policy implementation
It consisted of ‘developing the research needed for political decisions’ and the ‘establishment of a common system of scientific and technical reference’

5. More abundant and more mobile human resources
This objective posits a ‘greater mobility of researchers in Europe’, the ‘introduction of a European dimension into scientific careers’, a ‘greater place and role for women in research’, and ‘giving the young a taste for research and careers in science’

6. A dynamic European landscape, open and attractive to researchers and investment

An aim to get ‘a reinforced role for the regions in the European research effort’, to achieve the ‘integration of the scientific communities of western and eastern Europe, and ”making Europe attractive to researchers from the rest of the world’

7. An area of shared values

It is related to the need of ‘tackling the questions of science and society in their European dimension’, and the ‘development of a shared vision of the ethical issues of science and technology’

Two years later, in the Barcelona European Council (2002), a target of 3% of GDP in total R&D investment by 2010 was agreed, including that two thirds of this investment would be financed by the business sector.

Unfortunately, in 2004 little evidence could be found of the benefits of the Lisbon Strategy. For instance, there was no clear progress in catching up processes, little employment improvements, and no brain-drain reduction. The EC reviewed the Strategy and, although endorsing it, decided to renovate it with a more intense focus on knowledge investment, innovation and human capital. Implications for ERA were principally oriented to get a stronger international dimension and more relevance of universities (EC, 2005).

In 2007, the Green paper “The European Research Area: New Perspectives” (EC, 2007), that was underpinned by a stakeholder consultation, gave a new impetus to ERA. The Green paper revitalised the ERA concept and gave a wake-up call to all the actors of the European R&D system on the importance of ERA for the future of European research. It also served to present a definition of six new ERA dimensions:

1. Realising a single labour market for researchers
2. Developing world-class research infrastructures
3. Strengthening research institutions
4. Sharing knowledge
5. Optimising research programmes and priorities
6. Opening to the world: international cooperation in S&T

In 2008, in the context of the Ljubljana Process, the EC moved forward ‘towards full realisation of ERA’ (Council of the European Union, 2008b). The process responded to a large extent to the fact that Lisbon targets were not likely to be achieved by 2010. It established the necessity of pursuing the ‘enhanced governance for the ERA’, with special attention to the necessity of developing ‘a long-term vision for the ERA based on the objectives of the Lisbon Strategy’. In “2020 Vision for the European Research Area” (Council of the European Union, 2008a) it was stressed that coordination and cooperation activities in
ERA should be organised with Member States in voluntary terms and based on variable geometry. The "knowledge triangle" of research, innovation and education was also reaffirmed to improve international competitiveness and European sustainable development.

In 2009 the Lisbon Treaty came into force. In the Treaty the construction of ERA is considered an explicit objective, and it is stressed the importance of coordinating EU and national STI policies. For the first time, the competences of EU and Member States in R&D are referred to as 'shared' (Marinelli et al, 2014).

The economic crisis that Europe was suffering in 2008 gave rise to a reformulation in 2010 of the Lisbon Strategy. The ‘Europe 2020 Strategy’ (EC, 2010a) relies on three pillars: smart, sustainable and inclusive growth. All the European themes are linked to seven ‘Flagships initiatives’. The construction of ERA is included in the ‘smart growth’ pillar and has connections with several flags, principally ‘Innovation Union” and "A Digital Agenda for Europe". The Strategy emphasises joint programming with countries and regions and encourages the completion of ERA as a way of better supporting the development of ‘a strategic research agenda’ that targets global problems like ‘energy security, transport, climate change and resource efficiency, health and ageing, environmentally-friendly production methods and land management’ (ibid.).

During 2011, the potential of ERA was again assessed through a stakeholders’ consultation, which aimed to identify obstacles and gaps for the development and well-functioning of ERA (EC, 2012b). Only some months after the consultation, the Council (Council of the European Union, 2012) invited the European Commission to propose a framework for completing ERA by 2014. The reaction of the EC was presented in ‘A Reinforced European Research Area Partnership for Excellence and Growth’ (EC, 2012c). This communication reflects how the role of ERA stakeholders’ organisations will be reinforced and how much relevance will be given to the Member States henceforth. The EC recognised that an effective way of completing ERA by 2014 was to turn the traditional partnership between the Commission and the Member States into a new reinforced ERA partnership that includes the research stakeholder organisations. Stakeholders’ organisations actually had to formally state that they will actively help to achieve such a completion on time. Towards this end, the European Association of Research and Technology Organisations (EARTO), European Universities Association (EUA), the League of European Research Universities (LERU), NordForsk and Science Europe (SE) will constitute the first ERA stakeholders’ platform (SHOs). The Member States should also be committed to the completion of ERA by undertaking National Reforms. The European Commission will support them and will also ensure that Horizon 2020, the 8th Framework Programme, will actively contribute to the ERA successful realisation. A new ERA Monitoring mechanism (EMN) will also supervise reforms and provide more transparency to the Council (e.g. elaborating annual ERA progress reports). All the above structural initiatives would support the completion of ERA, which is declared to be at the heart of Europe 2020 Strategy through the ‘Innovation Union’ flagship, at a time when R&D investment is higher than ever before in the history of the EU (Horizon 2020 has a
budget of near 80 billion €). A strong ERA would be able to paralyse brain drain processes, reduce the differences between regions on innovation performances and promote excellence through smart specialisation in these regions (EC, 2012c). To make these ambitions a reality, the European Commission has proposed a reinforced ERA that is based on the following ERA priorities:

1. More effective national research systems
2. Optimal transnational co-operation and competition
3. An open labour market for researchers
4. Gender equality and gender mainstreaming in research
5. Optimal circulation, access to and transfer of scientific knowledge

By the end of 2012 the EC launched a survey to gather the opinion of research funding and research performing organisations on the implementation of ERA. This information, together with national authorities’ contributions, JRC analysis, and SHOs’ recommendations, among other sources, served to prepare the first ERA progress report (EC, 2013). Another survey preceded the ‘ERA progress report 2014’ (EC, 2014b) where it is acknowledged the necessity of making an ERA Roadmap in 2015 to guide national reforms, as invited by the Competitiveness Council Member States at the beginning of 2014 (Council of the European Union, 2014). The ERA progress report 2014 also admits that, although efforts are valuable, completing ERA is a gradual process that requires a stronger commitment by Member States to national reforms and continuous support of the reinforced ERA partnership actors. Following the Council’s suggestion, in April 2015 the ERA roadmap (2015-2020) was formulated (ERAC, 2015). Based on the reinforced ERA partnership’s insights, the roadmap identifies key priorities ‘to have the biggest impact on Europe’s science, research and innovation systems”. The roadmap also emphasises that ERA does not only cover research but also innovation. Although the existing five ERA priorities are maintained, some changes are introduced in priority 2 to stress the linkages between ERA and Horizon 2020 for jointly reinforcing ERA while addressing big challenges, and to explicitly recall the critical relevance of research infrastructures. It must also be noted that international cooperation is now considered a distinct priority in itself. In summary, the roadmap proposes the following priorities:

1. Effective National research systems
2. a) Jointly addressing Grand challenges
   b) Make optimal use of public investments in research infrastructures
3. An open labour market for researchers
4. Gender equality and gender mainstreaming in research
5. Optimal circulation and transfer of scientific knowledge
6. International cooperation

As for the actions needed to address these priorities, ERAC pays particular attention to the necessity of strengthening R&I evaluation, reinforcing Joint programming, guaranteeing long-
term sustainability of research infrastructures, promoting open and transparent recruitment in research, fostering inter-sectoral mobility of researchers, enhancing gender equality policies, improving knowledge transfer mechanisms, ensuring an open access to publications and encouraging cooperation with third countries. Foresight activities are explicitly recommended in priorities 1 and 2 in order to ‘support the selection of topics for future joint initiatives’ (ERAC, 2015).

We have seen how the evolution of ERA, in particular, and European cooperation in Science and Technology in general, has suffered several ups and downs. The most important orientation changes referred to the recognition that ERA needed to be based on flexible cooperation between countries and not so much on integration aims. Over the decades, flexibility has been the necessary condition to make possible such coordination and served to bring different Member States’ interests and capabilities on board.

However, after 2014 something started to change. New monitoring initiatives, national reforms requirements and stakeholders’ formal commitments were oriented to give the Commission a better control and remove the idea of the progression of ERA as an endless ambition.

The idea of ERA has been present, admittedly, originally in a very primitive manner, in the European debate from the very beginning of the European construction. The previous paragraphs have briefly described its historic development. One main conclusion is that, rather than a project, the ERA process represents the growth and shaping of a concept. This concept reflects the importance that knowledge, the EU’s fifth freedom (Potočnik, 2007), has had during the last fifty years in the European socio-economic and cultural context.

5.2. VERA at a glance

The VERA project - Forward Visions on the European Research Area - (Daimer et al, 2015) started in February 2012 to ‘provide relevant strategic intelligence for the future governance and priority-setting of the RTDI system in Europe and for better adapting science, technology and innovation policy to the shifting global environment and upcoming socio-economic challenges’.

Although in the initial stages of this foresight project ERA was framed around the six dimensions stated in the Green paper (EC, 2007), the core parts of the work, especially those corresponding to future scenarios construction and policy recommendations generation are entirely based on the objectives for a reinforced ERA (EC, 2012c) i.e. a) more effective national research systems, b) optimal transnational co-operation and competition, c) an open labour market for researchers, d) gender equality and gender mainstreaming in research, and e) optimal circulation, access to and transfer of scientific knowledge.

The project was developed from February 2012 to January 2015. Fraunhofer-ISI was the project coordinator. The other partners were: Unitatea executiva pentru finantarea invatamantului superior, a cercetarii, dezvoltarii si inovarii (UEFISCDI, Romania, Universiteit
Twente (The Netherlands, Universite de Marne la Vallee (IFRIS, France), Austrian Institute of Technology (AIT, Austria), The University of Manchester (UNIMAN, United Kingdom), Teknologian tutkimuskeskus (VTT, Finland), Agencia Estatal Consejo Superior de Investigaciones Cientificas (CSIC, Spain), Joint research centre- European Commission (JRC, Belgium), Zentrum fuer Soziale Innovation (ZSI, Austria).

The project tasks, as presented in the description of work, were:

1. FLA Stocktaking, to gather R&I forward looking activities in Europe and overseas, and evaluate their potential contribution to European ERA-related policies formulation and policies decisions
2. ERA Key Factors, to identify key factors for ERA development
3. ERA Scenarios, to build scenarios for the evolution of ERA up to 2020 that serve to provide a ground for strategic debates, decision making and priority setting
4. ERA Qualities, to evaluate the scenarios with respect to ERA Vision 2020, identifying the consequences of ERA scenarios in a context where an innovative Europe was able to tackle and solve societal challenges
5. ERA Strategies, to explore strategic answers on the ERA critical aspects and deliver sound recommendations on RTDI policies and their governance
6. Stakeholder Engagement & Communication Strategy, to engage ERA actors, including from the international perspective
7. Management and Quality Control, to guarantee the effective coordination of the project, including the definition of an external review and quality control system

The VERA project used the scenario methodology to develop RTDI alternative futures, as described in the ‘ERA Scenario report’ (Teufel et al, 2013). The scenarios were built with a factor-oriented approach, including key factors identification, key aspects alternatives for each factor (factor projections), building scenarios by combining these alternatives, and scenario writing.

The VERA scenarios, which are described in detail in annex 10.4.1, represent the following future alternatives:

- Scenario 1: Private Knowledge – Global Markets
- Scenario 2: Societal Challenges – Joint Action
- Scenario 3: Solutions apart – Local is beautiful
- Scenario 4: Times of Crises – Experts at the Wheel

These scenarios represent two types of transitions (Table 9).
Table 9 Transitions in VERA scenarios

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Transition type</th>
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<tbody>
<tr>
<td>Scenario 1 and 2</td>
<td>Incremental changes in RTDI governance and its surroundings</td>
</tr>
<tr>
<td>Scenario 3 and 4</td>
<td>Emergence of new socio-technical regimes leads to transformative structural changes</td>
</tr>
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Adapted from the VERA Deliverable 3.1: ERA Scenario Report (Teufel et al, 2013)

While scenarios 1 and 2 represent incremental changes in the governance of RTDI, research landscape and socio-economic context, scenarios 3 and 4 reflect new socio-technical regimes, associated with structural changes.

To understand the level of transformation that VERA future scenarios represent with respect to today’s context, we can refer to the European financial crisis existing in 2013.

From that perspective, scenario 1 can be considered a ‘base line’ scenario because it somehow shows a continuation of existing economic trends.

As commented in the ERA scenario report, scenario 2 relies on Europe integration and coordination as a successful way of overcoming that crisis.

In scenario 3, however, a human-centred rationale based on local actions does not seem oriented to overcoming European financial problems.

In scenario 4, the crisis is addressed as a secondary effect of sustainable development and transformation.

5.3. The VERA recommending process

The University of Manchester led the ERA Strategies work package, which aimed to understand RTDI actors’ strategies and to build recommendations. This task was fed by the VERA scenarios. The work associated with this action research is focused on this package, and more specifically, on the generation of VERA recommendations.

Given that this thesis aims to explore the recommending phase of foresight, through our research questions, it is important to emphasize that the analysis of VERA is more oriented to the characteristics of the future scenarios (i.e. the outcome of the anticipation phase that feeds the recommending process) rather than on the process itself that gave rise to these scenarios. In this sense, VERA scenarios are just ‘given’, thus being a research input.

The objective of the ERA Strategies work package (WP5) was ‘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 a) engaging with key stakeholders to explore strategic responses on the critical issues for the ERA evolution, and b) providing sound recommendations on research and innovation (R&I) policies and their governance and coordination across ERA.”
The WP5 methodology was based on a Strategic Debate 1, which mobilised stakeholders and organised seven focus groups discussions. In this respect, it is important to highlight the potential of VERA as an exemplary case study, as the VERA process actually offered the opportunity of exploring seven replicated cases – ‘literal replication’ as pointed by Yin (2014)- representing each of them a different stakeholder focus group, and sharing exactly the same methodology.

After the Strategic Debate 1, a Strategic Debate 2 shared the elicited data with the stakeholders to validate the results. After the strategic debates, a final elaboration process gave rise to the final ERA Open advice report (Popper et al, 2015).

This section is deliberatively descriptive and sometimes may adopt a bullet style to reflect the sequence developed by the recommending process. A comprehensive analysis and reflection of each part of the VERA process is then provided in sections 5.4 (analysis of the prospective dimension of VERA), 5.5 (analysis of the participatory dimension), 5.6 (analysis of the policy/practical dimension) and 5.7 (summary).

5.3.1. Strategic debate 1

a) Stakeholders’ mobilisation

The strategic debate 1 mobilised 73 participants through 7 focus groups. Each group consisted of 10-12 members to permit a fluent and manageable discussion between participants. The stakeholder groups covered a wide spectrum of ERA actors: society, university and RTOs, industry, research funders, ERA instruments leaders, policy makers and international actors, thus representing most of the possible roles within the R&I European system. Interacting with policy makers in participatory advising was suggested by Heath & Gonzalez, 1995) as a process that reinforces confidence in the final advice.

Each group consisted of one type of actor. This homogeneity would help to understand seven different actors’ positions with respect to the ERA problem. We have already observed that the thinking efficacy of groups can be explained by the capacity of putting together people that share the same idea and conceptualisation of systems (Laughlin 1980, 1999; Cannon-Bowers et al. 1993; Hinsz, 1995; Kameda et al. 2002; Mathieu et al, 2000).

The selection took into account several levels of dominance and legitimacy, in line with the stakeholder salience theory described in the literature review. Legitimacy and power were the criteria utilised for categorising the potential participants as affected, dominant or dormant. The urgency criterion was not considered in the selection process.

To select R&I stakeholders the following guiding questions were considered, as stated in the VERA Communication Strategy:

a) “who have legitimate moral claims on ERA due to being potentially affected by the achievement of the ERA goals (affected stakeholder)?”

b) “who are powerful and may gain legitimacy (dormant stakeholder)?”
c) “whose claim or power may increase in the future (latent stakeholder)?”

d) “which entities are not actively involved within current ERA instruments?”

e) “are those entities actually or potentially affected if ERA fails or succeeds in achieving this goal?”

f) “have those entities power to influence the realisation of this goal?”

b) Data elicitation

The workshops developed in the Strategic debate 1 consisted of the following steps (a detailed description can be found in the facilitator’s guide included in the annex 10.4.2):

1. Present the VERA scenarios (documents and short video) to the participants and ask them to vote on their acceptance or rejection, i.e. inform, individually, on their most and least desired scenarios.

2. In every workshop there were three discussion groups. By discussion group it should be understood a conversation where 3-4 participants (stakeholders) debate on a specific future scenario and answer facilitator’s questions on opportunities, strategies, recommendations, etc. Each group debated two different scenarios. All the scenarios had to be discussed at least once during the workshop. All the opinions given by the group should have a high degree of consensus, which may eventually improve the quality and accuracy of the collective advice, as suggested by Yaniv (2004a, 2004b).

3. Asking stakeholders about R&I system opportunities and perceived threats, on behalf of his or her institution, in the hypothetical situation that they were repositioned in a particular scenario.

4. Asking stakeholders for their specific responses or strategies to the opportunities and threats identified in the context of each VERA scenario by 2030.

5. Asking stakeholders about possible R&I policy responses to the R&I system opportunities and threats identified in the context of each VERA scenario by 2030.

6. Describing and explaining the five current ERA priorities, divided into 15 ERA sub-priorities (informed by the ERA Progress Report 2013) to the participants. Then, asking them to vote on the importance of these sub-priorities. The participants also were asked to brainstorm on additional or enhanced priorities that should receive a prioritised attention by the European Commission. A total of 114 preliminary objectives were obtained and then the participants voted on their relevance for the future of ERA.

7. The participants clustered the formerly elicited actors’ strategies and the policy strategies into the ERA current and the expanded priorities obtained in the previous step.

8. Finally, the participants were invited to propose "today’s context" responses relevant to today’s context to address these ERA expanded priorities. The results were commented on in a plenary semi-structured discussion.
c) Data analysis

The big volume of insights obtained required the definition of a systematic depurating process. That process was done separately for each focus group in order to differentiate and understand the position of each type of stakeholder. The following section describes how the messages were processed.

1. Every message generated in a focus-group workshop was saved in a database and labelled according to the following questions:
   - In what scenarios was the insight generated?
   - What group-discussion (and facilitator) generated the insight?
   - Was the insight perceived as an opportunity or as a threat?
   - Did the opportunity or threat refer to the stakeholder’s concern or to the R&I system?
   - Importance given to this opportunity or threat by the participants (voting activity within each discussion-group).
   - Was the message an actor’s strategic action or rather was a stakeholder’s recommendation (i.e. an advice for policy makers)?
   - Was the strategic action or recommendation associated to an existing or an additional ERA priority? To which one?

2. Since the workshop methodology allowed one scenario to be discussed by different facilitators, those insights repeated by different discussion groups were merged into a single one and this merging process recorded. The merging process tried to maintain the participants’ original expressions, while avoiding authors’ interpretations to preserve transparency. We have just noted that the accuracy of advice would benefit from the integration of insights generated from multiple and non-correlated advisors (Soll, 1999; Johnson, Budescu, & Wallsten, 2001). As a consequence of this reduction procedure, the original database was reduced by around 30%. After this process, every single message could be tracked to identify its generating discussion and corresponding facilitator.

3. An overlapping analysis evaluated how many times the same insight was suggested in different scenarios. Budescu et al (2003) highlighted that the coincidence of recommendations across different advising processes increases decision maker’s confidence in these recommendations. In this sense, it was assumed that all the recommendations mentioned in more than two scenarios were robust and potentially relevant as well in "today's context". This generated an initial list of recommendations.

4. The "today's context" recommendations directly generated by the participants (see step 8 of data elicitation) were added to the list of recommendations.

5. Through content analysis and clustering the 114 objectives identified in the elicitation process (see point 5 of the previous section) were transformed into nine ERA dimensions, which were divided into 38 ERA aspects. Every single insight was
associated with one specific ERA dimension and ERA aspect. The proposed new ERA dimensions are described below (see the list of ERA dimensions and aspects in the annex 10.4.3):

1. Boosting research and innovation synergies
   The necessity of connecting research and innovation was a VERA stakeholders’ key message. It was better achievable through an active participation and interaction of stakeholders, especially on collaborative initiatives that link academia and industry.

2. Strengthening the global influence of ERA
   The second most suggested theme related to the global influence of ERA. According to VERA participants this influence is based on a solid infrastructure network and a common position with respect to the relationship with countries outside Europe.

3. Promoting smart R&I evaluation
   A smart R&I evaluation was found important to ensure transparency and reliability in funding decisions. The VERA participants pointed that evaluation aspects were not sufficiently emphasised in the ERA existing priorities.

4. Improving the governance of the EU R&I system
   The participants claimed for a more coherent and integrated European R&I system. Coherence needs to be achieved through a more effective governance that fosters the dialogue between R&I actors.

5. Fostering relevant science-society engagement
   Science-society engagement was an intensively discussed aspect in the VERA workshops. The topic was linked to Science education policies and responsible research and innovation debate. This dimension was not addressed in the current priorities, hence the emergence of science-society relation as a new distinct dimension.

6. Developing attractive and impactful research careers
   This dimension is one of the existing ERA priorities. The debate was very intense on the necessity of a more open labour market for researchers and more effective initiatives for cross-sectoral mobility.

7. Supporting knowledge co-creation and sharing
   This dimension is linked to the ERA priority on ‘optimal circulation, access to and transfer of scientific knowledge’, with a wider scope on transdisciplinarity for addressing societal challenges.

8. Achieving gender equality and social inclusion in R&I
   In general, gender discussions were marginal in VERA workshops, with the exception of society stakeholder focus group. The most important contribution of VERA to this dimension was the introduction of aspects like empathy, groups’ vulnerability and multiculturalism.

9. Reinforcing ERA regional and local outreach
   Regional issues were mainly addressed by policy makers. They emphasized the benefits of regional cohesion and considered regional challenges in the ERA agenda.
The described process served to elaborate seven policy-briefs. They summarised the principal ideas (opportunities, threats, strategic actions and policy recommendations) around the nine ERA dimensions. These briefs were used as background material for the Strategic debate 2 symposium. The aim of the symposium was to validate the results of the Strategic debate 1.

5.3.2. Strategic debate 2

The Strategic debate 2 included the participation of 32 RTDI stakeholders in a validation symposium. The objective of the symposium was to socialise the results obtained during the focus groups process and get feedback and approval from the stakeholders. The participants were provided with 7 policy briefs that reflected the opportunities, threats, strategies and policy insights generated in each stakeholder’s focus group.

The symposium methodology consisted of three phases:

a. The participants were asked to read the policy briefs generated in the Strategic debate 1, and to form an opinion on the main insights strength and pitfalls.

b. The participants were asked to assess (individually) the relevance for "today’s context" of the recommendations generated in step 3 of the data analysis.

c. Different group discussions were organised to discuss the prioritised recommendations. The participants made their own fleshing-out of these recommendations, i.e. adding new contents. Each group presented their conclusions.

The new contents added to the recommendations in this symposium were used to enrich the next phase whereby the final advice was elaborated.

5.3.3. Advice discourse elaboration

The elaboration of the VERA WP5 final advice was a process through which the elicited policy insights took the form of an advice narrative or discourse.

The process includes two new approaches that constitute innovations in the practice of foresight. One of these innovations consisted of using a polygonal approach to elaborate the advice. This implied the utilisation of a nonagon, based on the 9 ERA dimensions identified in the step 5 of data analysis. The nine ERA dimensions and their associated 38 ERA aspects guided the structure of the final ERA Open advice report.

Secondly, VERA has introduced the innovative concept of bundling, which consists of the creation of consistent packages of recommendations.

The text below describes in a schematic and sequential way the VERA advice elaboration steps, where these two innovations are referred to:

1. Analysing the 9 ERA dimensions and 38 ERA aspects, based on existing R&I literature.
   By analysing each of the nine sides of the ERA nonagon, i.e. adopting a polygonal
approach, it would be guaranteed that the recommendations were rightly associated to each of these nine dimensions in the final report. As far as the ERA nonagon represents the ERA stakeholders’ principal R&I themes, and given the broadness of these themes, we may assert that the polygonal approach is an effective method to ensure that the final advice will at least pay attention to every relevant aspect of the R&I landscape.

2. Reviewing different related EC policies in order to identify, by each ERA dimension, what R&I stakeholders’ ideas were already implemented (given that the objective of VERA did not specifically include endorsing existing policies, these insights were not considered in the elaboration of the final advice). This process also helped to confirm the connection between the recommendations and the policy problem.

3. By each dimension, the internal VERA team transformed the participants’ identified opportunities and threats into policy recommendations. The transformation of opportunities or threats into policy recommendations (inference) is an important aspect of foresight advising that requires the intervention of experts. It is based on the assumption that the recommended policy actions favour the development of strengths and avoid or eliminate threats.

4. Integrating several related insights into specific recommendations, i.e. transforming insights into a more completed piece of advice. This also included the reviewing of those insights that were fleshed out by the symposium participants in the Strategic debate 2. During this step, the VERA internal team added R&I contents, fleshed out the recommendations, covered gaps with additional recommendations, eliminated inconsistencies, and provided final recommendations with adequate argumentation. The work was subjected to an internal and iterative peer review process.

5. Making a list of the recommendations that were finally included in the report as an annex, and use them to create policy bundles. These bundles were composed of 9 different recommendations, each of them corresponding to one of the 9 ERA dimensions, thus covering all the important R&I areas.

The VERA bundles looked at the ERA problem with three Horizon 2020 lenses (excellence, industrial leadership, and societal challenges perspectives) (see annex 10.4.5). In parallel, two additional bundles were created of the recommendations generated in the focus groups, and the recommendations validated in the symposium. Given that every bundle covered nine recommendations (corresponding to the 9 ERA dimensions), the VERA team decided that each bundle would specify those recommendations that were most important to solve the problem (leading actions), those actions that could establish the conditions to address the problem (enabling), and those recommendations that were appropriate to control or monitor the sustainability of the effects (supporting actions).

The concepts of polygonal frame and bundling, conceived during this action research and implemented for the first time in VERA, are intimately linked. By constructing bundles around the frame, the advisor guarantees the delivery of a comprehensive set of recommendations.
that cover all the key dimensions of the problem. In other words, while the polygonal frame encourages advisors to consider every aspect of the problem (the VERA the nonagon provides a frame for comprehensive solutions to systemic RTDI problems), bundling contributes to create a more reinforced and consistent advice formed of a set of mutually reinforcing recommendations (one recommendation per dimension). The use of packages or bundles was conceived of as a way of reinforcing the efficacy of individual recommendations. The joint action inherent in the recommendation bundles increases the capacity or sufficiency of the advice to address the policy problem.

5.4. The prospective dimension of VERA

This section aims to analyse and understand the participants’ reaction to the prospective aspect of Miles’ fully-fledged foresight. In particular, it tries to analyse the VERA participants’ response to the VERA future scenarios.

This would contribute to an understanding of the effects that the output of the anticipating phase of foresight have, in general, as an input of the recommending phase.

The reaction to the future is based on the opinion that the participant has in each scenario. But to form an opinion on each scenario, the participant needs first to understand and assimilate the characteristics of the future proposed. Only then can they imagine what sort of impact the scenario would have on the institution that he or she represents. This formed opinion is very much reflected by the level of desirability, i.e. the participant’s actual acceptance or rejection of scenario. Desirability will therefore be the first aspect studied in the VERA analysis.

Independent of their desirability, future scenarios could also have intrinsic characteristics that make participants more actively involved and predisposed to give more and more precise ideas. The capacity of VERA scenarios to stimulate the generation of insights is thus the second aspect that will be considered in this research to understand the contribution of the prospective dimension of foresight.

The abundant evidence (participants’ insights) of VERA could in principle support the analysis of the scenarios desirability and stimulation capacity. The number of insights generated per participant in each scenario, the originality of these insights, and the variety of perspectives or themes addressed will be the criteria used (measured) to support the analysis. This is based on the reviewed literature on creativity presented in chapter 2. A more detailed justification is provided in 5.4.1.

The first part of this section presents the VERA preliminary assumptions and data, thus supporting the rest of the empirical analysis. The second part describes the scenarios desirability analysis. Finally, the third part presents the analysis of the scenario stimulation capacity. A scheme of the analysis developed in the second and third part of this section can be found in Table 10.
This Table describes the strategy followed in the analysis. In total, the analysis consists of six parts. The first three explore how the desirability of scenarios can influence the volume of insights generated, their originality and the themes or perspectives generated. The remaining ones analyse the influence of scenarios, independent of their desirability, on these same three indicators.

**Table 10** Prospective analysis

<table>
<thead>
<tr>
<th>SCHEME OF VERA ‘PROSPECTIVE’ ANALYSIS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prospective (anticipatory) aspects of foresight to be analysed</strong></td>
</tr>
<tr>
<td>Scenario desirability</td>
</tr>
<tr>
<td>Scenario stimulation capacity</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

**5.4.1. Preliminary information**

In this section the nature of the VERA empirical data is explained, the activity of the focus groups in quantitative terms, and the criteria of analysis. It also provides some Tables that will be used in the following analytical sections.

The section is purely descriptive. It merely aims to put forward the analytical basis for sections 5.4.2 (scenario desirability analysis) and 5.4.3 (scenario stimulation capacity analysis).

a) Nature of VERA empirical data

The empirical analysis of VERA relies on those ideas directly generated by participants during the VERA stakeholders’ workshops, i.e. the analysis does not take into account the elaborated recommendations generated in subsequent writing up phases. As a matter of fact, the ideas, or insights, used in the following analysis are strictly the ‘raw material’ elicited from VERA WP5 discussions, i.e. primary data that is free from potential post-workshop interpretations and interferences. The relevance of unique and exclusive data was already mentioned by Van Swol & Ludutsky (2003) in relation to advice practice. The access and analysis of this primary material was only possible by action research, i.e. by taking part and directly participating in VERA WP5 workshops design and facilitating different discussions groups.
The master Table of annex 10.4.4 provides a summary of the insights generated in VERA

b) Summary of the VERA focus groups activity

Table 11 presents a description of the VERA workshops activity. In particular, it presents the number of discussion groups and participants that actually talked about each scenario. As mentioned before, a discussion group is understood to be a conversation where some participants debate a specific scenario.

The number of persons that took part in every discussion group is a relevant figure to be considered in the analysis, as far as it allows consideration of the results of the discussion group at the individual level.

In the Table 11 we can see that scenario 2 was the future context most discussed by participants, 44 persons, in contrast to scenario 3, which was debated by 30 participants. The number of participants per group was very similar across scenarios.

**Table 11** Discussions and discussants in VERA focus groups

<table>
<thead>
<tr>
<th>Stakeholder's workshop</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
<th>Scenario 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Society</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Academy</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Industry</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Funders</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ERA instruments</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>International</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Policy makers</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>10</td>
<td>12</td>
<td>8</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stakeholder's workshop</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
<th>Scenario 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Society (9 persons)</td>
<td>3</td>
<td>6</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Academy (12 persons)</td>
<td>8</td>
<td>8</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Industry (10 persons)</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Funders (11 persons)</td>
<td>4</td>
<td>11</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>ERA instrument (13 persons)</td>
<td>4</td>
<td>9</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>International (6 persons)</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Policy makers (12 persons)</td>
<td>12</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>38</td>
<td>44</td>
<td>30</td>
<td>34</td>
</tr>
</tbody>
</table>

| Participants per group | 3.80 | 3.66 | 3.75 | 3.40 |
c) Criteria of analysis

As mentioned above, the data obtained from these discussion groups served to study how the VERA anticipatory phase, represented by the VERA scenarios, influenced the number of insights generated, their originality, and the perspectives addressed.

Human intelligence acknowledges *fluency, originality, flexibility* and *elaboration* of ideas as constitutive elements of human *creativity* (Guilford, 1950; Torrance, 1968, 1974; Amabile, 1983; Weisburg, 1986; Paulus, 2000; Kincaid & Duffus, 2004). Foresight represents a creative and practical process of intelligence that encourages participants to produce multiple (fluency), imaginative (original) ideas, also inviting them to observe the potential solutions to problems from different angles (perspectives flexibility). The level of precision (or elaboration) of the generated recommendations and the final advice discourse depends to a large extent on the ability of the foresight team and the sponsor’s requirements.

The decision of analysing fluency in this research, i.e. studying the number of insights generated by the different VERA focus groups as a response to future scenarios, was conceived with the intelligence-related literature and confirmed during the action research process. In fact, the high volume of ideas generated in the stakeholders’ workshops naturally invited analysis of the degree to which some groups were more fluent and productive than others in front of VERA scenarios.

Following Swede (1993) and Rietzschel et al (2010) the empirical analysis of VERA should include the assessment of the originality of its recommendations. A first overview of the workshops elicited insights indicated that while some messages were somehow conventional, other ones were innovative and unexpected.

The analysis of flexibility is basically justified by of the design of VERA Strategic debate 1. Focus groups were conceived of as capturing a very specific groups of stakeholders’ opinions and perspectives on the future of ERA. It was reasonable, therefore, to analyse how these themes or perspectives could vary across the different actors.

The importance of the fourth element of creativity, i.e. the elaboration of ideas, was confirmed when reviewing some studies and theories of argumentation. This was revealing as to what extent the articulation of the advice discourses could be considered an important pillar of this research. It was assumed that the elaboration of advice discourses could eventually contribute to present more effectively the benefits of their recommended actions. However, such an elaboration could be also influenced by the characteristics of the actors involved in this process. The discourse analysis developed in ‘Visions for Horizon 2020’ was useful to explore this influence, and to understand how in the practice messages and can be transmitted through a well elaborated narrative. Moreover, VERA action research also offered the opportunity of participating in the discourse elaboration process.

Flexibility, originality and flexibility are analysed in this prospective section and the participatory dimension (section 5.5). The elaboration aspect is analysed as an aspect related to the policy/ practical dimension of foresight (section 5.6).
1. Fluency: volume of insights generated during the focus groups discussions.

The generation of many and various ideas is one of the most important aspects required of participants in foresight projects. Foresight discussions are normally fed by future scenarios in order to stimulate participants’ debates and elicit a high number of insights. Only by collecting a sufficient number of informed and creative ideas are foresight projects able, in principle, to produce practical solutions and recommendations.

Table 12 derives from the master Table of the annex 10.4.4. It shows the number of insights generated by the participants of the different VERA focus groups for each scenario. These figures will be used throughout the entire analysis to evaluate fluency aspects in the generation of recommendations. It is important to note that figures in Table 12 are absolute and should not be interpreted on their own. During the analysis they are therefore analysed in relation to the figures of Table 11, i.e. rated with the different number of persons that debated in each scenario. To make a preliminary observation, while scenarios 1 and 2 were the least stimulating ones, scenarios 3 and 4 predisposed participants to deliver a higher quantity of insights per participant.

<table>
<thead>
<tr>
<th>Number of insights</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
<th>Scenario 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Society</td>
<td>4</td>
<td>17</td>
<td>7</td>
<td>20</td>
</tr>
<tr>
<td>Academy</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Industry</td>
<td>8</td>
<td>8</td>
<td>10</td>
<td>24</td>
</tr>
<tr>
<td>Funders</td>
<td>11</td>
<td>20</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>ERA instruments</td>
<td>10</td>
<td>24</td>
<td>21</td>
<td>15</td>
</tr>
<tr>
<td>International</td>
<td>4</td>
<td>6</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Policy makers</td>
<td>32</td>
<td>9</td>
<td>18</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>75</td>
<td>89</td>
<td>73</td>
<td>92</td>
</tr>
<tr>
<td>Insights/ participant</td>
<td>2.0</td>
<td>2.0</td>
<td>2.4</td>
<td>2.7</td>
</tr>
</tbody>
</table>

2. Originality of insights

In this thesis we have already mentioned the importance that the participants’ creativity has in foresight processes. In fact, many recommendations would be useless if they merely reproduced very conventional ideas or commonplaces.

Given the capacity of scenarios to introduce values, ideas or specific themes to the foresight recommending debate, it is important to evaluate to what extent these scenarios, and/or their level of desirability (i.e. participants’ acceptance) may have an effect on the predisposition of people to think more originally.

However, an objection could be made that personal skills have more influence on the generation of original ideas than the characteristics of the scenarios. As the design of VERA focus groups did not take into account the level of creativity of the participants, the analysis
across so many debates (40 group discussions, as stated in Table 11) allows us to ignore the potential deviation of results due to the particular influence of highly creative people.

We have created an indicator to assess the originality of ideas and avoid the subjectivity normally associated with creativity measurements. This indicator consists of observing how many ideas are mentioned by each stakeholder in one scenario, while not being mentioned in another scenario or by a different stakeholder. Through a comprehensive analysis of focus groups elicited data, a set of original (‘unique’ and non-repeated) insights were obtained, as described in Table 13.

A very preliminary reflection on the figures of Table 13 indicates that scenario 3 and 4 have better stimulated the originality of insights (original ideas per participant) than scenarios 1 and 2.

Table 13 Original insights generated in VERA focus groups

<table>
<thead>
<tr>
<th>No. of ideas generated by a stakeholder group (in one scenario) and not mentioned in another scenario or by other stakeholder (i.e. original ideas)</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
<th>Scenario 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Society</td>
<td>0</td>
<td>6</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Academy</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Industry</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Funders</td>
<td>8</td>
<td>6</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ERA instruments</td>
<td>4</td>
<td>14</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>International</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Policy makers</td>
<td>20</td>
<td>5</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>Original ideas/ participant</td>
<td>1.03</td>
<td>0.98</td>
<td>1.27</td>
<td>1.74</td>
</tr>
</tbody>
</table>

3. Flexibility: variety of perspectives

As supported by the literature, creativity is not only related to the capacity of proposing many and original ideas, but also to the human ability or flexibility to look at problems from different perspectives. In this respect, our analysis will try to learn how VERA scenarios have actually contributed to stimulate the number of perspectives from which the VERA stakeholders have looked at the ERA problem.

At this stage, the analysis of perspectives is focused on the number of different perspectives generated, without distinguishing yet what specific perspective or theme has been addressed (this point is analysed in section 5.5).

Table 14 draws on the master Table of annex 10.4.4 and presents the number of different perspectives generated in each scenario per stakeholder.

Table 14 Perspectives generated in VERA focus groups
To briefly comment on Table 14, we observe that the number of different perspectives per participant is slightly higher in scenarios 3 and 4 than in scenarios 1 and 2. The society representatives, for example, show very different reactions to scenario 1 in comparison to scenario 4. While scenario 4 gave rise to 9 types of R&I themes in their insights (i.e. every new ERA dimension was targeted) scenario 2 stimulated discussion from only two types of perspectives.

Once presented the baseline Tables and supporting reflections, we can start the analysis itself. As described, the analysis includes the study of the effects that scenario desirability and scenario stimulation capacity have on fluency, originality of advice and flexibility of perspectives.

### 5.4.2. Analysis of scenario desirability

The objective of this section is to explore how the different desirability of scenarios affects the generation of insights. As already explained, the criteria of analysis will be the volume of insights generated, their originality and the number of perspectives discussed.

#### a) Analysis of the influence of scenario desirability on the generation of insights

Desirability of future scenarios is an important aspect to explore, since accepting future contexts could potentially influence the advisors’ behaviour during the discussions and have an effect on their eventual recommendations.

One of the first activities of the VERA workshops was the description and voting on future scenarios. The VERA participants’ acceptance of VERA scenarios was varied across the different stakeholder groups. Once the four VERA visions were explained, the participants voted both their most and least desirable scenarios from the perspective of the institution they were representing in the workshop. The results of the seven groups voting can be seen in Tables 15 and 16. While scenario 2 was the most desirable one for the majority of groups, scenario 1 was selected as the least desirable on five occasions. Only Society and Industry
actors found scenario 4 more desirable than scenario 2. Scenarios 1 and 3 were not found desirable by any group of stakeholder.

Tables 15 and 16 present an important level of unanimity across VERA stakeholders. In fact, five different stakeholders show identical preferences. In addition, no scenarios were found both most and least desirable by different actors, which somehow reflects the coherence and consistency of the VERA scenarios.

It is also interesting to see that incremental scenarios 1 and 2 (more similar to the "today's context") provoked more reactions (82 vs. 64 votes, adding positive and negative ones) that scenarios 3 and 4 (highly transformed scenarios). This is probably because voting on scenarios' desirability has induced participants to think more pragmatically; thus participants found easier and more practical to vote plausible and gradual contexts than very hypothetical, transformed or non-plausible situations. Another reason refers to the fact that the voting process was one of the first tasks developed during the workshop, and at that time the participants may have been still finding difficult to assimilate and vote on the transformed scenarios.

**Table 15** Most desirable VERA scenarios

<table>
<thead>
<tr>
<th>MOST DESIRABLE (votes)</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
<th>Scenario 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Society</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Academy</td>
<td>0</td>
<td>6</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Industry</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Funders</td>
<td>0</td>
<td>5</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>ERA instruments</td>
<td>0</td>
<td>5</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>International</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Policy makers</td>
<td>1</td>
<td>6</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>3</td>
<td>27</td>
<td>22</td>
<td>21</td>
</tr>
</tbody>
</table>

**Table 16** Least desirable VERA scenarios

<table>
<thead>
<tr>
<th>LEAST DESIRABLE (votes)</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
<th>Scenario 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Society</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Academy</td>
<td>4</td>
<td>0</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Industry</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Funders</td>
<td>9</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>ERA instruments</td>
<td>13</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>International</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Policy makers</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>7</td>
<td>15</td>
<td>6</td>
</tr>
</tbody>
</table>
Based on the figures of Tables 11 and 12, Table 17 calculates the number of insights generated by participant in each scenario (scenario stimulation capacity rate) and includes the stakeholders’ preferred scenarios. Table 17 also supports the elaboration of Tables 18, 19, 20, and 21.

Although it is reasonable to assume that desirability has a direct influence on the production of ideas, i.e. favourite scenarios could give rise to a higher volume of insights per actor and, conversely, rejected scenarios could produce less quantity of insights, the inverse influence also needs to be studied, i.e. it may also occur that favourite scenarios were less productive than undesirable ones. For this reason, the study described below is twofold, representing the analysis of both the direct and the inverse influence.

Table 17 VERA desirability & stimulation capacity

<table>
<thead>
<tr>
<th>Scenario stimulation capacity rate= insights per participant</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
<th>Scenario 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Society</td>
<td>1.3</td>
<td>2.8</td>
<td>2.3</td>
<td>3.3</td>
</tr>
<tr>
<td>Academy</td>
<td>0.8</td>
<td>0.6</td>
<td>1.0</td>
<td>2.3</td>
</tr>
<tr>
<td>Industry</td>
<td>2.3</td>
<td>2.7</td>
<td>3.3</td>
<td>2.4</td>
</tr>
<tr>
<td>Funders</td>
<td>2.8</td>
<td>1.82</td>
<td>1.75</td>
<td>1.33</td>
</tr>
<tr>
<td>ERA instruments</td>
<td>2.25</td>
<td>2.7</td>
<td>2.33</td>
<td>3.8</td>
</tr>
<tr>
<td>International</td>
<td>1.3</td>
<td>2.0</td>
<td>2.0</td>
<td>2.7</td>
</tr>
<tr>
<td>Policy makers</td>
<td>2.7</td>
<td>2.3</td>
<td>4.5</td>
<td>3.0</td>
</tr>
<tr>
<td>2.0</td>
<td>2.0</td>
<td>2.4</td>
<td>2.7</td>
<td></td>
</tr>
</tbody>
</table>

- Direct influence analysis

Tables 18 and 19 represent a comparative analysis of scenarios desirability and the scenarios stimulation capacity, i.e. the generation of ideas. This analysis is based on the ratios of Table 17.

The diagonal of Table 18 corresponds to those situations in which the most desirable scenario is also the most stimulating one. As shown in Table 18 this situation only happens on one occasion. In fact, only the society representatives have produced the highest number of ideas per participant when they were talking on their preferred scenario (scenario 4). This effect is not observed in the rest of the actors.

As for the analysis of undesirability in Table 19, we note that three of the seven stakeholders (Society, ERA instruments specialist and International stakeholders) produced the lowest number of insights per person in their undesirable scenario. This result is not strong enough to allow us to affirm that participants’ motivation and their interest in providing insights is lower in undesirable scenarios.
Table 18 Cross-cutting analysis of scenarios desirability and stimulation capacity

<table>
<thead>
<tr>
<th>MOST DESIRABLE</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
<th>Scenario 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOST STIMULATING</td>
<td>Funders</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scenario 1</td>
<td></td>
<td>Funders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scenario 2</td>
<td></td>
<td></td>
<td>Policy makers</td>
<td>Industry</td>
</tr>
<tr>
<td>Scenario 3</td>
<td></td>
<td></td>
<td></td>
<td>Industry</td>
</tr>
<tr>
<td>Scenario 4</td>
<td>Academy</td>
<td>ERA instruments</td>
<td>International</td>
<td>Society</td>
</tr>
</tbody>
</table>

Table 19 Cross-cutting analysis of scenario undesirability & stimulation capacity

<table>
<thead>
<tr>
<th>LEAST DESIRABLE</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
<th>Scenario 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEAST STIMULATING</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scenario 1</td>
<td>Society</td>
<td>ERA instruments</td>
<td>Industry</td>
<td></td>
</tr>
<tr>
<td>Scenario 2</td>
<td>Policy makers</td>
<td></td>
<td>Academy</td>
<td></td>
</tr>
<tr>
<td>Scenario 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scenario 4</td>
<td>Funders</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Both Tables 18 and 19 suggest that scenario acceptance or rejection has no influence on the participants' insights generation. This is important in demonstrating that participants, in principle, are neither predisposed to deliver more ideas when they discuss their most preferred scenarios nor do they deliver fewer ideas when discussing their least preferred ones.

- Inverse influence analysis

In Tables 20 and 21 we can observe the inverse cross-analysis of desirability and stimulation. The aim of this analysis was to confirm or discard the proposition that people are better stimulated by undesirable scenarios.
Both academy and policy maker stakeholder groups found the same scenario (2) the most desirable, yet the least stimulating (table 20). Scenario 2 is oriented to societal challenges and the EC ambition of European R&I coordination. It is not surprising that academic stakeholders (who in general deal with Horizon 2020 issues and other EC R&I themes) and policy makers (who by their nature are involved in EC aspects) have found scenario 2 less attractive than other scenarios to talk about, as it is something they endlessly deal with on their daily work.

On the other hand, Table 21 explores the relationship between undesirable scenarios and high stimulation of ideas. Only research funders and industry proved to be well motivated by their undesirable scenario. Research funders found scenario 1 a challenging and problematic context, thus they were interested in providing the highest number of solutions.
on that context in contrast to other scenarios. The same explanation can be given to industry stakeholders, who, when discussing scenario 3 (focused on human and individual aspects), provided a higher number of insights (probably to avoid it). However these findings are not significant, and our discussion of stakeholder motivations which connect the generation of ideas and un/desirability of scenarios remains anecdotal.

In fact, what the analysis has shown is that desirable scenarios do not incite participants to generate a bigger quantity of ideas. Nor can we affirm that undesirable scenarios are less stimulating than desirable ones.

When exploring the contrary effect, not enough evidence exists to infer that desirable scenarios give rise to a smaller number of insights than undesirable scenarios, or on the contrary to affirm that undesirable scenarios can provoke more effectively foresight participants so as to generate more ideas.

b) Analysis of the influence of scenario desirability on the originality of insights

Table 22 was calculated using the number of participants from Table 11 and the number of original ideas from Table 13. The coloured cells indicate the stakeholders’ desirability of scenarios, as stated in Table 15 and 16. This Table analyses to what extent the acceptance or rejection of scenarios affects the originality and creativity of the generated insights.

**Table 22 Analysis of desirability and originality**

<table>
<thead>
<tr>
<th>No. of ideas (per participant) generated by a stakeholder group (in the scenario) and not mentioned in any other scenario or by other stakeholder</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
<th>Scenario 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Society</td>
<td>0.00 (**)</td>
<td>1.00</td>
<td>1.33</td>
<td>2.50 (*)</td>
</tr>
<tr>
<td>Academy</td>
<td>0.25 (**)</td>
<td>0.38</td>
<td>0.25 (**)</td>
<td>1.50 (*)</td>
</tr>
<tr>
<td>Industry</td>
<td>0.75 (**)</td>
<td>1.67 (*)</td>
<td>1.33</td>
<td>1.50</td>
</tr>
<tr>
<td>Funders</td>
<td>2.00 (*)</td>
<td>0.55</td>
<td>0.25 (**)</td>
<td>0.33</td>
</tr>
<tr>
<td>ERA instruments</td>
<td>1.00 (**)</td>
<td>1.56</td>
<td>1.33</td>
<td>2.50 (*)</td>
</tr>
<tr>
<td>International</td>
<td>0.67 (**)</td>
<td>1.33</td>
<td>1.67</td>
<td>2.00 (*)</td>
</tr>
<tr>
<td>Policy makers</td>
<td>1.67</td>
<td>1.25 (**)</td>
<td>2.75 (*)</td>
<td>1.50</td>
</tr>
<tr>
<td>Total across seven groups</td>
<td>1.03</td>
<td>0.98</td>
<td>1.27</td>
<td>1.74</td>
</tr>
</tbody>
</table>

Before discussing direct and inverse influence of desirability, we may note that, in terms of originality of ideas, scenario 4 was the most stimulating one on four occasions (see mark * in Table 22) and scenario 1 was the least stimulating for five stakeholders (see mark **).
The discussion that gave rise to a higher number of original and creative ideas was by policy
makers about scenario 3 (2.75 original ideas per participant). Meanwhile, the society
representatives’ discussion on scenario 1 did not provide a single original insight.

If we analyse the Table by columns, we find that research funders were the more original
contributors in scenario 1. In scenario 2 the most original group was the industry
stakeholders. Policy maker representatives were the most creative group in scenario 3.
Finally, in scenario 4 the society group was the stakeholder that provided more original
ideas.

As with the previous section, here we make a twofold analysis of desirability. First we will
interpret Table 22 to clarify whether desirable future scenarios have the capacity to foster
creativity and originality in elicited ideas more efficiently than other scenarios. Secondly, the
analysis will try to explore whether, on the contrary, originality is actually better enhanced by
undesirable scenarios.

- Direct influence analysis

It might be reasonable to suppose that desirable scenarios stimulate the generation of
creative insight, based on the assumption that people are more interested in contributing
original ideas when talking about attractive and potentially beneficial contexts.

However, in Table 22 we can see that for most groups the most desirable scenario does not
coincide with the most stimulating one (in terms of originality). The policy makers group, in
addition, shows that the most desirable scenario may even be the one that least favours the
production of creative ideas. Only the society group complies with our initial assumption.

As for undesirability, we can see that in society, academy, ERA instruments and international
stakeholder groups the undesirable scenarios are the ones that more poorly stimulated the
creativity of participants. However, this result (four groups out of seven) is not strong enough
to confirm that undesirability hinders creativity, especially given the fact that this specific
result most likely means the opposite behaviour (i.e. desirability of scenarios favours
creativity), which is actually the relation that was discarded in the previous paragraph.

In light of the VERA data, we can therefore assume that there is not a direct influence of
scenario desirability or undesirability, on the production of original or conventional ideas,
respectively.

- Inverse influence analysis

We will now make an analysis of the opposite proposition, that desirable scenarios are an
obstacle to creativity and undesirable scenarios favour the generation of original and creative
ideas.

In Table 22 on one occasion the desired scenario was the least stimulating one (policy
makers’ debate on scenario 2, which was their favourite one). The Table also indicates that
the least desirable scenario was the most stimulating one only for the research funders group. These behaviours are not present in the other discussion groups.

From the analysis of Table 22 we can therefore conclude that desirability does not inversely influence the production of creative ideas in foresight projects.

c) Analysis of the influence of scenario desirability on the number of perspectives addressed

Now that we have analysed the effects of future scenarios desirability on the creation of original ideas, we will next explore whether desirable scenarios have more capacity than other scenarios to stimulate the generation of ideas from multiple perspectives.

Similarly to previous desirability analysis, the study is again made from a direct and inverse point of view.

In the analysis we make use of Table 23, which includes the figures presented in Table 14, rated by the number of participants (see Table 11), as well as the desirability rating (coloured cells) presented in Tables 15 and 16. (*) indicates the highest value on each row and (**) represents the lowest one.

**Table 23 Analysis of desirability and perspectives generated**

<table>
<thead>
<tr>
<th>No. of different perspectives (ERA dimensions) per participant</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
<th>Scenario 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Society</td>
<td>0.67 (**)*</td>
<td>1.17 1.00</td>
<td>1.50 (*)</td>
<td></td>
</tr>
<tr>
<td>Academy</td>
<td>0.63 0.50</td>
<td>0.75 1.25</td>
<td>1.00 0.67</td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td>1.00 1.33</td>
<td>1.67 (*)</td>
<td>0.70 (**)*</td>
<td></td>
</tr>
<tr>
<td>Funders</td>
<td>1.50 (*)</td>
<td>0.27 (**)*</td>
<td>0.50 0.67</td>
<td></td>
</tr>
<tr>
<td>ERA instruments</td>
<td>1.00 0.67</td>
<td>0.78 1.50</td>
<td>1.00 0.67</td>
<td></td>
</tr>
<tr>
<td>International</td>
<td>1.00 (**)*</td>
<td>1.00 (**)*</td>
<td>1.33 2.00</td>
<td>1.00 1.50</td>
</tr>
<tr>
<td>Policy makers</td>
<td>0.50 (**)*</td>
<td>1.00 1.50</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Total across seven groups</td>
<td>0.79 0.70</td>
<td>1.00 1.14</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Direct influence analysis

Similar to the analysis of originality, the society group was the only one that clearly reflected a direct influence, i.e. its desirable scenario 4 is at the same time the one that provoked a focus on the highest number of perspectives, and vice versa, its undesired context, scenario 1, was the one that gave rise to the lowest number.

Interestingly, we can find the reverse effect in the industry and research funders groups. They actually looked at the ERA problem from a higher number of perspectives in its undesired scenarios, and present a lower number in the desirable ones.
Out of seven focus groups, stakeholders’ desired scenarios have stimulated a higher number of perspectives (i.e. direct effect of desirability on the number of perspectives) only in one occasion (society), whereas undesirable scenarios have implied the lower number of perspectives in three occasions (society, international and policy makers groups).

The analysis of the figures on Table 23 allowed us to conclude, therefore, that the scenarios desirability has no direct influence on the variety of perspectives from which foresight participants look at the problem and generate insights.

- Inverse influence analysis

Now, inversely, we analyse whether undesired scenarios favoured the observation of the ERA problem by the VERA participants from multiple angles. In two cases (research funders and industry stakeholders) out of the seven the least desirable context turned out to be also the most stimulating one, so no conclusions can be drawn.

5.4.3. Analysis of the stimulation capacity of VERA scenarios

The analysis developed above allows us to conclude that neither the desirability nor the undesirability of scenarios have direct or inverse influence on the generation of insights (fluency), their originality, or the variety or flexibility of perspectives addressed.

However, discarding the effect of desirability does not imply that future scenarios have no other influence over the characteristics of the participants’ insights. Connecting in practice the anticipating and recommending phases of foresight means to understand future scenarios as instruments that are integrally incorporated into the recommending process, thus bringing specific elements, contextual messages, properties and perspectives into the advising discussions, and consequently influencing and stimulating, to a greater or lesser extent, the participants’ mindset. The next sections will explore how the scenarios characteristics affect the advice features.

As in the desirability analysis section, the use of scenarios in VERA will be analysed with respect to the following indicators: the capacity of scenarios to generate insights (volume of ideas), their potential to foster original insights, and their capacity to make participants look at the problem from a variety of angles or perspectives.

a) Analysis of the scenarios capacity to stimulate the generation of insights

The stimulation capacity of scenarios has been calculated in terms of the number of different insights produced by the VERA participants (see Table 11 and 12). The stimulation capacity rates are presented in Table 24 for every scenario and focus group.

This Table shows that scenario 4 was the most stimulating context (see mark * in Table 24) for four actors (society, academy, ERA instruments, and international stakeholders). Scenario 3 was the most stimulating for two actors (industry and policy makers). Only research funders found scenario 1 most stimulating. Scenario 2 was not found the most stimulating by any stakeholder.
### Table 24 VERA scenarios stimulation capacity

<table>
<thead>
<tr>
<th>Scenario stimulation capacity rate=insights per participant</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
<th>Scenario 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Society</td>
<td>1.3 (**)</td>
<td>2.8</td>
<td>2.3</td>
<td>3.3 (*)</td>
</tr>
<tr>
<td>Academy</td>
<td>0.8</td>
<td>0.6 (**)</td>
<td>1.0</td>
<td>2.3 (*)</td>
</tr>
<tr>
<td>Industry</td>
<td>2.3 (**)</td>
<td>2.7</td>
<td>3.3 (*)</td>
<td>2.4</td>
</tr>
<tr>
<td>Funders</td>
<td>2.8 (*)</td>
<td>1.82</td>
<td>1.75</td>
<td>1.33 (**)</td>
</tr>
<tr>
<td>ERA instruments</td>
<td>2.25 (**)</td>
<td>2.7</td>
<td>2.33</td>
<td>3.8 (*)</td>
</tr>
<tr>
<td>International</td>
<td>1.3 (**)</td>
<td>2.0</td>
<td>2.0</td>
<td>2.7 (*)</td>
</tr>
<tr>
<td>Policy makers</td>
<td>2.7</td>
<td>2.3 (**)</td>
<td>4.5 (*)</td>
<td>3.0</td>
</tr>
<tr>
<td>Total across seven groups</td>
<td>2.0</td>
<td>2.0</td>
<td>2.4</td>
<td>2.7</td>
</tr>
</tbody>
</table>

Table 24 also shows that scenario 4 was for one group (research funders) the least stimulating future scenario. Scenario 3 was the least stimulating scenario for none of the stakeholders. Scenario 2 was the least stimulating for two groups (academy and policy makers). Scenario 1 was the least stimulating for four stakeholders (society, industry, ERA instruments, and international stakeholders).

Diagram 9 calculates and represents the stimulation capacities of every scenario across the seven stakeholders. In this Diagram, scenario 4 and 3 have a higher capacity of insight stimulation than scenarios 1 and 2, which present the same rate.
To better interpret the figures of Table 24 and Diagram 9, the Table 25 presents a ranking with the number of times that the scenario is considered the most or the least stimulating one by each VERA stakeholder.

**Table 25 Scenario stimulation ranking (4: most stimulating; 1: least stimulating)**

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>More realistic scenarios</th>
<th>More transformed scenarios (less plausible)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Scenario 1</td>
<td>Scenario 2</td>
</tr>
<tr>
<td>Society</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Academy</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Industry</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Funders</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>ERA instruments</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>International</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Policy makers</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
<td>16</td>
</tr>
</tbody>
</table>

In this Table, a mark from 1 to 4 is given, 1 indicating the least and 4 indicating the most stimulating scenario for each stakeholder.

The analysis of the scores shows that scenarios 1 and 2 (12 and 16 points respectively) were, across stakeholders, less stimulating scenarios than scenarios 3 and 4, which present similar scores (20 and 22 points).

The Table 26 also adds some observations on the stimulation capacity of scenarios. In the Table we can note that, in total, scenarios 1 and 2 were just in one occasion more stimulating than scenarios 3 and 4, while scenarios 3 and 4 were in six occasions more stimulating than scenarios 1 and 2 (42 in relation to 28 total points).

**Table 26 Scenario stimulation capacity**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>No. times most stimulating</th>
<th>No. times least stimulating</th>
<th>Ranking points</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1 (realistic)</td>
<td>1</td>
<td>4</td>
<td>12</td>
<td>28</td>
</tr>
<tr>
<td>Scenario 2 (realistic)</td>
<td>0</td>
<td>2</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Scenario 3 (highly transformed)</td>
<td>2</td>
<td>0</td>
<td>20</td>
<td>42</td>
</tr>
<tr>
<td>Scenario 4 (highly transformed)</td>
<td>4</td>
<td>1</td>
<td>22</td>
<td></td>
</tr>
</tbody>
</table>

Although acknowledging that calculating percentages on very low numbers is problematic, the Diagram 10 can serve at least to graphically illustrate this stimulation capacity effect.
This analysis invites reflection on the characteristics that more strongly differentiate scenarios 1 and 2 from scenarios 3 and 4. In particular, returning to the ERA scenario report to find an important difference. The VERA scenarios were the consequence of two different types of transitions of the European research landscape. While scenarios 1 and 2 represented an incremental evolution of RTDI governance, scenarios 3 and 4 were designed as the consequence of deep structural changes, somehow reflecting, when compared with scenario 1 and 2, more transformed and less realistic visions of the European research system.

The Table 26 and the Diagram 10 actually shows that highly transformed scenarios 3 and 4 have stimulated more effectively the generation of ideas in the VERA focus groups than incremental scenarios 1 and 2. Scenario 1, which is considered in the ERA scenarios report as the most realistic and ‘baseline’ scenario, was the least stimulating scenario in four focus groups, and on the contrary, scenario 4, which is probably the most transformed one, was the most stimulating on four occasions.

Both bar Diagrams 9 and 10 show that realistic scenarios have had less capacity in the VERA project to inspire the creation of ideas than those scenarios that represent higher levels of transformation.

The analysis above suggests that the level of transformation of future scenarios with respect to the present, i.e. the level of differentiation of scenarios vis-à-vis the ”today's context”, have influence on the number of insights generated by the people stimulated with these scenarios. Since this analysis is based on 146 participants in 40 group discussions (see Table 11) this finding is empirically well supported.

b) Analysis of the scenarios capacity to stimulate the generation of original insights
To analyse the influence of scenarios on the originality of ideas we need to examine Table 27. This Table shows that scenario 4 has facilitated a higher number of original ideas (on average, 1.74 original ideas per participant across the seven focus groups) than other scenarios. The least stimulating scenario, in terms of originality, was scenario 2 (0.98 original ideas per participant, across the seven groups).

If we analyse scenarios in pairs, scenario 3 and 4 inspired the highest originality in five actors, whereas scenario 1 and 2 were more inspiring on two occasions. Scenarios 3 and 4 have in common their high level of transformation in contrast with scenario 1 and 2 which are more realistic. Similar to the previously described analysis of scenarios stimulation capacity, we may argue again that transformed scenarios are useful to favour and stimulate the elicitation of more original ideas.

This is explained by the necessity of participants to rely more actively to non-conventional solutions when they focus their mindsets on unfamiliar or radical contexts.

<table>
<thead>
<tr>
<th></th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
<th>Scenario 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Society</td>
<td>0.00 (**)</td>
<td>1.00</td>
<td>1.33</td>
<td>2.50 (*)</td>
</tr>
<tr>
<td>Academy</td>
<td>0.25 (**)</td>
<td>0.38</td>
<td>0.25 (**)</td>
<td>1.50 (*)</td>
</tr>
<tr>
<td>Industry</td>
<td>0.75 (**)</td>
<td>1.67 (*)</td>
<td>1.33</td>
<td>1.50</td>
</tr>
<tr>
<td>Funders</td>
<td>2.00 (*)</td>
<td>0.55</td>
<td>0.25 (**)</td>
<td>0.33</td>
</tr>
<tr>
<td>ERA instruments</td>
<td>1.00 (**)</td>
<td>1.56</td>
<td>1.33</td>
<td>2.50 (*)</td>
</tr>
<tr>
<td>International</td>
<td>0.67 (**)</td>
<td>1.33</td>
<td>1.67</td>
<td>2.00 (*)</td>
</tr>
<tr>
<td>Policy makers</td>
<td>1.67</td>
<td>1.25 (**)</td>
<td>2.75 (*)</td>
<td>1.50</td>
</tr>
<tr>
<td>Total across seven groups</td>
<td>1.03</td>
<td>0.98</td>
<td>1.27</td>
<td>1.74</td>
</tr>
</tbody>
</table>

From this analysis, we conclude that as highly transformed realities are composed of different, new and original elements with respect to the today-reality, and these realities will favour the development of creative thinking in foresight processes.

c) Analysis of scenario capacity to stimulate the generation of multiple perspectives

This analysis tries to clarify whether the characteristics of scenarios affect the predisposition of participants to look at the problem from different perspectives. As previously stated, the perspectives considered in the analysis are the nine new ERA dimensions.
The study will focus on Table 28, which presents the perspectives generated per participant. Those cells marked with (*) indicate the highest values along rows and the cells marked with (**) represent the lowest ones.

Table 28 shows that in scenario 1 research funders were the stakeholders that targeted a higher number of perspectives per participant (1.5). In scenario 2 and scenario 3 the industry group was the one who contemplated, with their insights, the ERA problem from a higher variety of perspectives (1.33 and 1.67 rates, respectively). In scenario 4 the international stakeholders were the group with the highest value (2.00).

Table 28 also shows that scenario 4 generated the highest number of perspectives or dimensions in four stakeholder groups - shadowed cells - (society, academy, ERA instruments, and international). Scenario 3 elicited a higher number of perspectives than other scenarios in two groups (industry and policy makers). Whilst, scenario 1 generated a higher number of perspectives on only one occasion (research funder group). Interestingly, scenario 2, in spite of being a future context closely related to existing R&I policy initiatives open to analysis from multiple perspectives, was never the most stimulating context in terms of perspectives generated.

Diagram 11 graphically represents the total number of perspectives generated by each participant in every scenario. In the Diagram we observe that scenario 4 and 3 have a slightly stronger capacity to elicit a variety of perspectives from participants (1 and 1.14 dimensions addressed, respectively) than scenarios 1 and 2. (0.79 and 0.70 perspectives per participant).

Table 28 Perspectives and stimulation analysis

<table>
<thead>
<tr>
<th>No. of different perspectives (ERA dimensions) per participant</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
<th>Scenario 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Society</td>
<td>0.67 (**))</td>
<td>1.17</td>
<td>1.00</td>
<td>1.50 (*)</td>
</tr>
<tr>
<td>Academy</td>
<td>0.63</td>
<td>0.50 (**)</td>
<td>0.75</td>
<td>1.25 (*)</td>
</tr>
<tr>
<td>Industry</td>
<td>1.00</td>
<td>1.33</td>
<td>1.67 (*)</td>
<td>0.70 (**)</td>
</tr>
<tr>
<td>Funders</td>
<td>1.50 (*)</td>
<td>0.27 (**)</td>
<td>0.50</td>
<td>0.67</td>
</tr>
<tr>
<td>ERA instruments</td>
<td>1.00</td>
<td>0.67 (**)</td>
<td>0.78</td>
<td>1.50 (*)</td>
</tr>
<tr>
<td>International</td>
<td>1.00 (**)</td>
<td>1.00 (**)</td>
<td>1.33</td>
<td>2.00 (*)</td>
</tr>
<tr>
<td>Policy makers</td>
<td>0.50 (**)</td>
<td>1.00</td>
<td>1.50 (*)</td>
<td>1.00</td>
</tr>
<tr>
<td>Total across seven groups</td>
<td>0.79</td>
<td>0.70</td>
<td>1.00</td>
<td>1.14</td>
</tr>
</tbody>
</table>

From these results, we can conclude that transformed scenarios only moderately incite foresight participants to look at the problem from different perspectives.

In theory, it is logical that repositioning participants into radically changed contexts would motivate them solve problems from many different angles, however, the results are not categorical.
Are participants’ preferred themes in foresight discussions better influenced by the participants’ attributes than by the scenarios characteristics? Some of these attributes, like the preferred area of knowledge or the actor’s function within the R&I system, are analysed in the next section.

**Diagram 11 Perspectives generated per participant**

![Diagram showing perspectives generated per participant by scenario](image)

5.5. The participatory dimension of VERA

As mentioned in the literature review, people’s opinions and decisions can be often explained in relation to human attributes like values, knowledge resources, and perceptions (Mitroff, 1983; Sabatier, 1988; Jobert 1989; Scharpf, 1997). These attributes and roles may predispose foresight participants, independent of future scenarios, to look at systemic problems from a very broad or, on the contrary, from a very limited number of perspectives. Including creative people in foresight workshops can provide to the group, according to Amabile (1983), knowledge, capacity of understanding complexities, and motivation. As stated in the literature, the ability to look at the problems from different and flexible angles is also a characteristic of creative people.

Foresight is by nature a creative thinking process that needs to take into account this sort of flexibility. This is a crucial aspect of problem-solving and decision-making processes, insofar as observing problems from different points of view facilitates the generation of alternative and varied solutions. Flexibility when looking at problems is essential for tackling complex policy issues like the one targeted by VERA, i.e. providing advice for the future of ERA.

Given that VERA discussions involved seven homogeneous groups of R&I stakeholders, it is interesting to analyse how each of these groups approached the ERA problem. In collective thinking processes like foresight, which usually targets systemic issues, the role that participants develop within the actual system also explains the position that participants adopt with regard to collective problems and the type of solutions proposed. In particular, this
section attempts to clarify whether their role in the R&I system and their area of knowledge explains the flexibility or the concentration on particular ERA dimensions.

The analysis focuses on Tables 29 and 30. Table 29 presents participants’ insights classified by the focus group where they were generated, and their corresponding ERA dimension or perspective (see annex 10.4.3). Table 30 (%) builds on from Table 29 and serves to identify each stakeholder’s preferred ERA dimensions.

The following is a guide to the marks included in the cells of Table 30: Mark (*) indicates stakeholder’s preferred dimension; Mark (**) indicates the stakeholder that is most interested in this dimension; Mark (***) indicates that both previous circumstances (*) and (**) happen simultaneously.

**Table 29** Number of insights by actor and ERA dimension

<table>
<thead>
<tr>
<th></th>
<th>Society</th>
<th>Academy</th>
<th>Industry</th>
<th>Funders</th>
<th>ERA instr.</th>
<th>Internat.</th>
<th>Policy makers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research &amp; Innovation</td>
<td>2</td>
<td>0</td>
<td>9</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Global ERA</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>11</td>
<td>6</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>R&amp;I evaluation</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>R&amp;I governance</td>
<td>12</td>
<td>6</td>
<td>22</td>
<td>19</td>
<td>26</td>
<td>8</td>
<td>27</td>
</tr>
<tr>
<td>Society-science</td>
<td>12</td>
<td>5</td>
<td>4</td>
<td>0</td>
<td>9</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Research careers</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Knowledge</td>
<td>9</td>
<td>7</td>
<td>5</td>
<td>4</td>
<td>10</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Gender</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Regional</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>7</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>48</td>
<td>24</td>
<td>51</td>
<td>42</td>
<td>69</td>
<td>24</td>
<td>71</td>
</tr>
</tbody>
</table>

**Table 30** Insights (%) generated by actor and dimension: actor’s preferences

<table>
<thead>
<tr>
<th></th>
<th>Society</th>
<th>Academy</th>
<th>Industry</th>
<th>Funders</th>
<th>ERA instr.</th>
<th>Internat.</th>
<th>Policy makers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research&amp; Innovation</td>
<td>5%</td>
<td>0%</td>
<td><strong>17%</strong></td>
<td><strong>7%</strong></td>
<td>6%</td>
<td>0%</td>
<td>3%</td>
</tr>
<tr>
<td>Global ERA</td>
<td>6%</td>
<td>5%</td>
<td>10%</td>
<td><strong>27%</strong></td>
<td>9%</td>
<td>8%</td>
<td>13%</td>
</tr>
<tr>
<td>R&amp;I evaluation</td>
<td>6%</td>
<td>0%</td>
<td>0%</td>
<td><strong>7%</strong></td>
<td><strong>1%</strong></td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>R&amp;I governance</td>
<td>25% *</td>
<td>25% *</td>
<td><strong>43%</strong></td>
<td><strong>45%</strong>*</td>
<td>38%*</td>
<td>33% *</td>
<td><strong>38%</strong></td>
</tr>
<tr>
<td>Society-science</td>
<td><strong>25%</strong>*</td>
<td>21%</td>
<td>8%</td>
<td>0%</td>
<td>13%</td>
<td>13%</td>
<td>12%</td>
</tr>
<tr>
<td>Research careers</td>
<td>2%</td>
<td><strong>12%</strong></td>
<td>6%</td>
<td>2%</td>
<td>8%</td>
<td><strong>13%</strong></td>
<td>3%</td>
</tr>
<tr>
<td>Knowledge</td>
<td>19%</td>
<td><strong>29%</strong></td>
<td>10%</td>
<td>10%</td>
<td>14%</td>
<td>17%</td>
<td>13%</td>
</tr>
<tr>
<td>Gender</td>
<td>6% **</td>
<td>4%</td>
<td>2%</td>
<td>0%</td>
<td>1%</td>
<td>4%</td>
<td>1%</td>
</tr>
<tr>
<td>Regional</td>
<td>6%</td>
<td>4%</td>
<td>4%</td>
<td>2%</td>
<td>10%</td>
<td>12%</td>
<td><strong>17%</strong></td>
</tr>
<tr>
<td></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
By looking at the columns in Table 30 we can identify (*) actors’ preferences.

Society actors, for example, were interested in science-society engagement. This result is reasonable given that society representatives would be directly affected by any policies in this direction. They have also found it important to tackle the ERA problem through the improvement of R&I governance. This dimension represents quite a broad perspective, so it is not surprising that society actors, who are less familiar with other (more technical) dimensions had prioritised governance aspects.

Academic actors have shown interest in knowledge co-creation and sharing, which is aligned with their role within the R&I system, especially in relation to knowledge transference between universities and firms.

Industry stakeholders have focused their insights on governance and innovation aspects. A better R&I governance would improve businesses operations in a broad range of aspects, e.g. financial issues, infrastructures availability, employment market development, etc. The high interest in research and innovation synergies is not surprising since firms are one of the most important innovators within the R&I system.

Research funders have presented a high interest in governance and global ERA. The focus in governance suits with the role that research funders actually develop in the system. Their objectives are linked to policy decisions and public funds availability. A global ERA was found important to rationalise the action of funders internationally, as well as to coherently support funding decisions with commonly accepted criteria.

ERA instruments specialists were basically interested in governance themes, somehow reflecting their holistic perspective and their varied ERA related objectives.

The international stakeholders also focused their insights on generic themes, principally related to governance. Transferring knowledge from Europe to developing countries was also a relevant aspect discussed in this focus group.

Finally, most of the policy makers’ advice referred to governance aspects. Given the nature of this actor, these results were somewhat expected. Interestingly, policy makers also more actively recommended policy actions oriented to solving regional imbalances, which relate to the policy makers’ sense of subsidiarity, and somehow confirms their concerns on the development of European less favoured areas.

Below some reflections are also made on the analysis of the rows in Table 30. It complements the analysis of the columns presented above. The most relevant findings can be summarised as follows:

1. Innovation issues were principally debated by industry stakeholders. This is aligned with the result obtained in the vertical analysis of this group. Firms are actually one of the most active actors in terms of innovation. It is also interesting to observe that academic actors, despite recommending some actions on innovation, were not very incisive on commenting innovation and research connection aspects.
2. The interest in Global ERA is commonly low for all ERA stakeholders, with the exception of research funders, who show a very high rate. Leaving aside the obvious importance that global and overseas aspects have in general for the future of ERA, and in particular for research funding actors, it cannot be discarded that this particular exception was the result of some participants’ particular areas of interest.

3. Research evaluation was mostly only discussed by research funding participants. It is surprising the limited interest of all groups on evaluation aspects, especially given the relevance that evaluation studies and research evaluation has on ERA, e.g. peer review, R&I project grants, excellence criteria, impact assessment or research policy evaluation.

4. Governance was the preferred dimension for all the actors with the exception of the academic group, who preferred to focus on knowledge aspects. Given the nature of the VERA project and the systemic challenge that ERA represents, it is coherent that governance aspects occupy a prominent role in the VERA focus group discussions.

5. Society actors showed a great interest in science-society engagement aspects, as could be initially expected. Academic actors were also very interested and provided many insights on societal linkages, principally due to the role of education policies in promoting a more effective approach for citizens to science.

6. Research careers aspects were predominantly discussed by the academic and the international group. It is interesting to observe the low percentage of careers aspects for almost all the R&I stakeholders. Research career issues have been inherent to the ERA debate from its outset. In this respect, the high number of initiatives in this direction may explain the low attention paid by the VERA stakeholders to this specific dimension.

7. Knowledge aspects were more profusely addressed by the academic group. All other stakeholders showed moderate interest in knowledge aspects.

8. Gender equality was a topic of quite intense discussion only in the society actors’ focus group. In the rest of discussions, themes related to diversity and vulnerability substituted the gender debate.

9. Regional matters gained the highest attention from policy makers. This is very consistent with the vertical analysis of this R&I actor. Other stakeholders paid only moderate attention to regional matters.

From the evidence identified above (through both the horizontal and vertical analysis) we conclude that the representation of the R&I system actors in foresight recommending panels, i.e. the composition of the discussion groups, contributes to observe and tackle systemic problems from those specific perspectives in which these recommending actors, due to the role on the system or area of expertise, are specially interested.

This finding is relevant insofar as the panel representation could potentially be designed to cover only some specific perspectives, thus positioning advice in a particular direction.
5.6. The practical dimension of VERA

The previous two sections were focused on the prospective and participatory dimensions of fully-fledged foresight. They analysed the VERA insights from the future-oriented and actor-oriented perspectives, respectively.

The analysis aimed to explain the contribution of future scenarios to the insights characteristics (fluency, originality and flexibility) as well as the influence of participants' attributes to the type of perspectives generated.

From the prospective analysis we have explored the importance of repositioning foresight participants in transformed scenarios, as far as they foster fluency and originality. We have also found that desirability of scenarios does not really have a large effect on the generation of insights.

From the participatory analysis we have found that the representation of actors in discussion panels is an important factor to be considered in the design of foresight recommending processes, insofar as representation induces flexibility in the utilisation of varied perspectives.

Both case studies have also shown that, in order to give sense to these repositioning and representation factors, foresight needs to be supported by well-structured resolution processes, which include the elicitation and argumentation of ideas. This resolution process actually represents the fourth component of creativity, elaboration, which was not yet studied in our prospective (section 5.4) or participatory (section 5.5) analysis.

Elicitation makes use of prospective tools (e.g. future scenarios) and an adequate participation, thus involving relevant people to discuss the problem addressed. After elicitation, argumentation is then useful to give sense and present the generated ideas.

Both the elicitation of ideas and the articulation of the advice discourse with argumentation are crucial parts of foresight recommending processes. The consistency required between the themes debated in the eliciting discussions, the contextual circumstances affecting the participants' opinions, and the pragmatic orientation that final argumentations need to show in the advice discourse reflect how much this resolution process (elicitation and argumentation intervention) is related to the policy/practical dimension of fully-fledged foresight. This dimension will be studied below on the basis of the VERA action research experience.

The first part of this study is focused on the generation of ideas or insights in VERA, trying to identify where the final advice was actually elicited or conceived (i.e. tracking VERA recommendations) throughout the whole recommending process.

The second part of the analysis tries to assess to what extent the necessary argumentation process has influenced and shaped the composition of VERA final recommendations with respect to the initial insights generated in the participants' discussions.

a) Tracking the generation of VERA recommendations along the VERA process
One of the reasons by which VERA was selected as a case study in this thesis was the possibility of conducting action research. This permitted to look thoroughly, and from inside, a well-structured foresight recommending process.

Only with an action research strategy was it possible to understand a foresight recommending process in-depth, and make fully tracked the generated recommendations. The tracking is useful to learn where recommendations are actually generated alongside the foresight process.

In Table 31 the results of the tracking are presented. It includes the number of final recommendations generated in VERA WP5 process, the relative percentage, and the identified source. The full list of VERA recommendations is listed in the annex of the ‘ERA Open advice report’ (Popper et al, 2015a).

**Table 31 Origins of VERA recommendations**

<table>
<thead>
<tr>
<th>Recommendations generated through scenarios</th>
<th>Recommendations directly generated by the VERA stakeholders, based on future scenarios discussions (refer to step 3 of data analysis section in 5.3.1.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>98 recs (62%)</td>
<td>Recommendations inferred by the VERA team, based on participants’ identified opportunities &amp; threats in future scenarios (refer to step 3 of advice elaboration section in 5.3.3.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recommendations not generated through scenarios</th>
<th>Recommendations directly generated by the VERA stakeholders, based on the “today’s context” (no future scenarios used) (refer to step 4 of data analysis section in 5.3.1.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 recs (38%)</td>
<td>Recommendations (extra) generated by the VERA team during the final writing process (refer to step 4 of advice elaboration section in 5.3.3.)</td>
</tr>
</tbody>
</table>

Below is brief description of the Table and the VERA recommendations sources:

- A large percentage of VERA recommendations (48.7%) were elicited from the participants, based on future scenario discussions. They basically emerged as a reaction to questions related to R&I system future strategies. The intervention of facilitators in elicitation activities served to align the final outcomes to the sponsor’s actual requirements and objectives.
- Some VERA recommendations (13.3%) were inferred from the participants’ perceived opportunities and threats in every future scenario. The inference of recommendations is a difficult task that must avoid subjectivity and personal preferences. It is preferably carried out by experts or by R&I specialised teams and peer review, as in VERA.

- Other VERA recommendations (19.6%) were based on "today's context" discussions. These discussions normally complement previous debates on future scenarios. In the VERA project the participants were invited to forget ERA future scenarios for a while, and some specific questions on existing ERA official priorities were used to trigger discussions. This strategy proved to be useful to make the workshops more dynamic and to obtain quickly and directly those policy recommendations not associated to scenarios.

- Finally, VERA recommendations (18.4%) were generated by the foresight team to fill gaps or reinforce participants’ messages. This is part of a fleshing out activity developed during the argumentation and writing process.

We can see that 62% of the VERA recommendations were made through the use of future scenarios. Other actions, 38%, could have been suggested without the support of the anticipatory phase of foresight, as far as they were just elicited from discussions on the "today's context".

We can see that the anticipatory phase of foresight has served to justify nearly two thirds of the VERA final advice. Although this result highlights the capacity of the VERA anticipatory phase to generate policy recommendations, it also reveals that foresight advice needs to be complemented in practice with "today's context" discussions.

Even more importantly, VERA action research has also demonstrated that participatory processes like foresight need to eventually (and often unavoidably) rely on the experience of and final interpretation by internal (or external) experts to elaborate more consistent pieces of advice. If neutrality is not ensured in this intervention, the whole process could be eventually called into question.

b) Analysing the influence of argumentation in the composition of VERA recommendations

Action research in VERA facilitated the exploration of the practical dimension of fully-fledged foresight. The practical orientation of foresight refers to the necessity of devising impactful actions to address systemic problems, and to convince the audience, with appropriate language, of the necessity of implementing these actions.

Articulating this discourse with a consistent argumentation is a critical task in recommending processes as far as it eventually transmits more faithfully and effectively the results of the advising process to the receptors. Making a contrastive explanation of participants’ points of view relates to the Bhaskar and Lawson notion of demi-laws, which aims to approximate solutions to complex social problems.
Good argumentation, however, may serve to arbitrarily enhance weak advice results. In contrast, poor argumentation could waste participants’ valuable insights or overlook the perspectives obtained through the discussions on future scenarios.

The elaboration of the VERA final discourse implied, among other tasks, developing a comprehensive sense making process, adding reinforcing literature and contents, covering gaps, articulating the discourse around a coherent structure, and providing a logically valid argumentation that helped to convince the ERA audience.

Although argumentation is an exercise susceptible to authors’ biases and personal interpretations, the action research developed in this thesis has observed that the discourse delivered in ‘ERA Open advice’ just reflects the participants’ opinions and positions. In fact, one virtue of the VERA process was to incorporate a detailed description of the foresight methodology, thus informing every step followed to write final recommendations.

Preparing and delivering seven policy briefs to the focus groups participants also helped to ensure transparency and objectivity. This also helped to increase the participants’ confidence in VERA and to create in them a sense of ownership with respect to the VERA final advice. To reinforce even more the reliability of the recommending process, the final synthesising and writing phase developed by the Manchester team was also subject to different internal rounds of peer reviewing.

Table 32 reflects the extent to which the resolution of the VERA process, i.e. the transformation of elicited initial insights into a final advice discourse, produced changes or variations between those participants’ primary ideas and the final recommendations. The analysis of these changes does not refer to content modifications but exclusively to the volume of ideas finally delivered on each of the ERA dimensions or clusters.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Insights %</th>
<th>Final recommendations %</th>
<th>Dif. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research &amp; Innovation</td>
<td>6</td>
<td>14</td>
<td>+8</td>
</tr>
<tr>
<td>Global ERA</td>
<td>11</td>
<td>8</td>
<td>-3</td>
</tr>
<tr>
<td>R&amp;I evaluation</td>
<td>3</td>
<td>12</td>
<td>+9</td>
</tr>
<tr>
<td>R&amp;I governance</td>
<td>36 (max.)</td>
<td>18 (max.)</td>
<td>-18</td>
</tr>
<tr>
<td>Society-science</td>
<td>13</td>
<td>8</td>
<td>-5</td>
</tr>
<tr>
<td>Research careers</td>
<td>6</td>
<td>12</td>
<td>+6</td>
</tr>
<tr>
<td>Knowledge</td>
<td>14</td>
<td>10</td>
<td>-4</td>
</tr>
<tr>
<td>Gender</td>
<td>2 (min.)</td>
<td>7 (min.)</td>
<td>+5</td>
</tr>
<tr>
<td>Regional</td>
<td>9</td>
<td>11</td>
<td>+2</td>
</tr>
<tr>
<td>Total %</td>
<td>100</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Dispersion of insights (Max – Min)</td>
<td>34</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>
To understand the rationales behind this sort of variations it is important to acknowledge
that, regardless of the quality and expertise of VERA participants, some topics that needed
to be covered, were somewhat overlooked. On other occasions, participants’ important
suggestions were only weakly drafted, so they had to be fleshed out with complementary
information and references. Sometimes, new recommendations were just the result of
separating into their constituent parts some broad participant suggestions. To some extent
the introduction and reduction of insights and recommendations on the VERA discourse
were found indispensable and unavoidable interventions that served to fill advice gaps and
eliminate inconsistencies. In general and despite this intervention, the recommendations in
VERA were clear and simple enough to allow participants to identify their own ideas.
In the Table we can observe, for instance, that the VERA focus groups provided a high rate
of R&I governance related insights (36%). They were gradually grouped and reduced to a
smaller number of recommendations, although remaining predominantly governance
recommendations (18%) in the final advice. Both initial insight rates and final
recommendations maintain R&I governance and gender issues as the most and least
preferred dimensions respectively. Another aspect worthy of comment is the reduction of the
dispersal of recommendations across the ERA themes (from 34 to 11). This reduction is
acceptable as far as it is the consequence of paying some attention to important topics that,
after the focus group discussions, other topics remained somehow underrepresented.
Independently of the transparency of the VERA process, one important lesson learnt from
this action research is to confirm that foresight processes, similar to other sorts of advising
exercises, are highly vulnerable due to the subjectivity that may bring the final argumentation
process. To guarantee the legitimacy of their discourses it is important to guarantee that
every modification or added input to the participants’ contribution is objective and fully
justified.

5.7. Summary of VERA findings

VERA action research has permitted us to observe, from inside, how policy advice can be
generated with a well-structured foresight process. The experience has facilitated the
identification of some connections between the foresight anticipating and recommending
process, as well as the observation of other foresight practical aspects.

In this section a brief summary of findings and reflections are presented in relation to the
three fully-fledged foresight dimensions.

a) On the prospective dimension

Although studies on future scenarios are numerous, a broad review of foresight literature has
not permitted the identification of references that explored the actual effect of future
anticipation in the generation of practical advice. This gap constituted the leitmotiv of this
thesis and motivated the research questions. In addition, the absence of literature on this
specific foresight aspect explains to a great extent why action research is, methodologically, the main pillar.

It is relatively easy to accept that future scenarios convey information to the recommending phase of foresight, thus connecting anticipation tasks with the foresight advising activity. However, the extent to which future scenarios can in practice influence the production of advice has been traditionally considered a difficult aspect to investigate. The comprehensive analysis of VERA empirical data (see section 5.4) suggests that this influence is related to the grade of transformation of the scenario discussed (distance that the scenario takes from the present context). The analysis actually suggested that positioning advisors in highly transformed or disruptive scenarios stimulates more effectively participants’ mindset, i.e. increasing the fluency of ideas, than positioning them in conservative or incremental scenarios. We can observe this ‘stimulation’ effect both in relation to the number of insights generated and the variety of perspectives produced. The analysis has also shown that, in general, positioning advisors in transformed scenarios augments their capacity to propose creative solutions. In other words, radical and creative scenarios can induce more effectively the production of original insights or ideas than conventional scenarios. Arguably, this fluency and originality impact is given by the ‘surprise’ effect that radical scenarios cause in the advisors’ mindset, in contrast to their reactions to ‘business-as-usual’ contexts.

The VERA analysis also confirmed, somehow surprisingly, that the level of attractiveness or desirability of scenarios does not stimulate, in comparison with undesirable scenarios, the generation of a higher number of original ideas by participants. Through practice, action research is thus putting into question assumptions that, in principle, are taken-for-granted (Winter, 1996).

The Table 33 summarises the results commented above on the prospective dimension.

**Table 33** Summary of VERA prospective dimension findings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Number of insights</th>
<th>Originality of the insights</th>
<th>Perspectives of the insights</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenarios desirability/acceptance</td>
<td>Direct</td>
<td>No influence</td>
<td>No influence</td>
</tr>
<tr>
<td></td>
<td>Inverse</td>
<td>No influence</td>
<td>No influence</td>
</tr>
<tr>
<td>Scenarios transformation</td>
<td>High influence</td>
<td>High influence</td>
<td>Some influence on the number of perspectives addressed</td>
</tr>
</tbody>
</table>

b) On the participatory dimension

The analysis of VERA stakeholders’ insights demonstrated that the representation of R&I actors in foresight discussions contributes to address systemic problems from those
perspectives more related to the role that these actors play in the system or to their personal area of expertise.

This means that, depending on the sponsor’s requirements or the contextual circumstances, the mobilisation and participation of actors in foresight recommending process could be ad hoc conceived and designed to look for solutions based on a broad range of perspectives or, on the contrary, to focus uniquely on some specific themes.

c) On the practical dimension

A intense action research was conducted during the elicitation and argumentation phases of the VERA process. This implied to give support to the organisation and development of stakeholders’ focus group discussions, help to understand how ideas are generated with foresight discussions in front of exploratory future scenarios, and to observe how those ideas can be argued and translated into final policy advice. 

As for insights generation, VERA has provided interesting results about the phases where recommendations actually emerge during foresight processes. In particular, we realised that recommendations are generated not only by direct elicitation but also as result of further inference processes or even externally introduced to cover gaps during the phase of argumentation.

As for the discourse argumentation phase (an aspect that was preliminarily explored in the discourse analysis of ‘Visions for Horizon 2020”), the VERA empirical analysis has served to confirm that an important intervention is often required to transform initial insights into a readable advice discourse. As a matter of fact, the legitimacy of the foresight process could be under threat if during this elaboration or fleshing out process the impartiality of the foresight team (or any other external group) is not entirely guaranteed.
6. UNDERSTANDING FULLY-FLEDGED FORESIGHT

The main objectives of this chapter are to make an in-depth examination of the two case studies’ results, to interpret them, and to reflect on some of their potential applications.

As already mentioned, this thesis aimed to understand how policy advice is generated with foresight. Methodologically, it has meant understanding both the advising process and the outcomes. A review of policy advice and foresight literature initially served to situate the problem and to learn what aspects are traditionally considered important when developing advice. Through it, a clearer idea was made on the type of recommendations policy makers normally expect.

A first methodological decision, in relation to the foresight outcomes, was to clarify whether the features of the advice produced with foresight processes could be explained in terms of the characteristics of the specific foresight-recommending procedures utilised to create such advice. To that end, the discourse presented in the case ‘Visions for Horizon 2020’ was studied. The study represents an adaptation of critical discourse analysis to advice discourses that could be utilised by foresight practitioners, and policy analysts in general, beyond the present research.

The discourse analysis proved to be useful for extracting lessons on the relevance that actors’ representation has in participatory advice, and the role that practical argumentation has in strengthening advice soundness and persuasiveness. However, despite the relevance of these findings, the analysis of advice discourse did not allow, a profound understanding of the anticipatory and recommending parts of the foresight process.

Consequently, a second decision, related to the foresight process, was to reinforce the methodology strategy with action research. In this respect, the VERA project constituted an excellent opportunity to be directly involved in a foresight process specifically developing policy recommendations. Through action research, the foresight recommending process was deeply scrutinised both from a technical (procedural) and social (contextual) perspective. The work developed in this action research basically included the organisation of seven stakeholder workshops, a symposium and a final conference, as well as direct participation in data analysis, interpretation and final advice construction. In practice, the action research developed in VERA served to collect a very significant volume of empirical data and to better understand, from the inside, the mechanisms of the foresight recommending process.

The analysis of VERA in this thesis was structured in relation to Miles’ conception of fully-fledged foresight. Given that the prospective, participatory and practical (policy oriented) components of fully-fledged foresight are central to the foresight discipline, it was found important to structure the VERA study (chapter 5) around these three dimensions (sections 5.4, 5.5 and 5.6), thus looking at the VERA process from these different perspectives. The large volume of data available and the practical observations gathered in the VERA project helped to answer the research questions while enriching understanding of these three elements.
As with chapter 5, the design of this chapter takes into account Miles’ prospective, participatory and practical perspectives.

The first section of the chapter justifies the exploration of fully-fledged foresight dimensions to understand the generation of policy advice with foresight. The next three sections (sections 6.2, 6.3, and 6.4) describe those factors which, from a prospective, participatory and practical orientation, influence the recommending process and impact on the features of the final advice. Then, a summary section (6.5) amalgamates these factors and presents those design parameters that need to be taken into account in the foresight recommending phase for modulating and strengthening the characteristics of the final advice. Finally, section 6.6 presents a discussion on the implications that sponsors, participants, facilitators and analysts or mediators’ intervention have in the recommending process.

6.1. Fully-fledged foresight as a process of collective intelligence

Future-thinking is an individual process with which people, very frequently, are unconsciously familiarised. In fact, human decisions, including those related to daily life, are based on anticipatory - usually short-term oriented - expectations and objectives. To some extent, every human action is motivated by plausible images of future scenarios, even with the horizon of a single day or week.

However, these individual's decisions and behaviours, in relation to the future, differ greatly from the practice of foresight. There are three important differences between foresight and individual future-oriented intelligence.

One key difference is based on the long-term orientation. In contrast to individual future-oriented daily decisions, long term thinking is inherent to the practice of foresight.

A second difference is based on the fact that making decisions on hypothetical future contexts requires an exercise of abstraction that individuals usually cannot carry out alone. Reasoning on future transformed scenarios is actually a complicated task that can be better addressed through participation, i.e. in conjunction with many other individuals.

A third aspect that reflects the difference between foresight and individuals’ forward-looking processes is the necessity of foresight to imagine visions and develop practical recommendations around them in a structured manner, rather than spontaneously. This structuring contributes to legitimate recommending processes which are actually conceived to support others’ (usually policy makers’) decisions on complex problems.

These three differences constitute to some extent an explanation for the concurrence of prospective, participation, policy orientation dimensions in Miles’ fully-fledged foresight conceptualisation.

To summarise, we can assume that fully-fledged foresight constitutes a process of collective intelligence that, if it is developed in a structured, practical and systematic manner, helps to overcome the difficulties that the human intellect encounters when trying, individually, to solve long-term future oriented problems. This assumption explains why the next sections try
to explore how the prospective, participation and policy/practical dimensions of foresight contribute to reinforce the potential of individual thinking.

6.2. The prospective dimension of foresight

The anticipation and recommending phases of foresight have very different objectives. While the former aims to create plausible future situations, the latter receives these constructions to generate practical alternatives for action. We can observe that the future dimension, i.e. the prospective component of fully-fledged foresight, is an aspect present in both phases. When analysing the foresight advising process, and in particular the connection between these two phases it is therefore important to study what is the contribution of future anticipation, i.e. what material is conveyed to the recommendation phase, and how the recommending participants actually react to that received material.

The VERA case, through the utilisation of future scenarios, has provided significant insights on this prospective aspect of fully-fledged foresight. The other case study, ‘Visions for H2020’, did not actually utilise preconceived future scenarios, but instead each participant used his or her own conception of the future.

This section consists of three parts. The first part examines the results obtained in chapter 5. The second part explains and interprets these findings. The third part presents an application of these results to generate different types of advice.

6.2.1. Examination of findings

In foresight one common procedure to explore the participants’ potential reaction to the future is to ask them about the level of desirability or acceptance that they feel when presented with future scenarios.

To decide whether a scenario is desirable or not, the participant previously carries out an exercise of abstraction so as to place his or her mindset in these proposed hypothetical contexts and to envisage the potential impact or implications that these contexts may have on his or her institution.

In principle, it seems reasonable that desired scenarios, i.e. those scenarios that theoretically would be beneficial for the participant, stimulate him or her to the extent that the participant will provide a higher number of ideas. However, and quite interestingly, the analysis of VERA data showed that the desirability of scenarios has little or no effect in the participants’ ideas fluency. The analysis actually suggests that the desirability of scenarios neither affects the originality of the insights elicited nor the number of perspectives addressed.

These findings imply that some of the aspects related to desirability that could in principle make participants identify more or less with any scenario (e.g. the interests on the topics addressed by scenarios, or their alignment with the messages or values behind them) are not strong enough to affect the characteristics of the advice delivered.
The results on desirability invited investigation into the influence of scenarios in the generation of advice independent of this acceptance (or rejection) component. In fact, ignoring the participants' predisposition to utilise a specific scenario (i.e. obviating desirability) would contribute to analyse exclusively the capacity of such scenario to stimulate the generation of ideas, and would help to identify those scenario intrinsic factors that affect the production of advice.

This analysis, which explores the capacity of the VERA scenarios to stimulate the generation of ideas, with independence of their desirability, presented some interesting results. The analysis showed that highly transformed VERA scenarios (3 and 4) generated a higher number of insights per participant than incremental scenarios (1 and 2). It proves that transformed scenarios normally give rise to more original insights from participants than those obtained with incremental scenarios.

To have a clearer idea of what transformation means in relation of scenarios, we may note that the VERA project considers transformed scenarios as the result of new socio-technical regimes, and they are intimately associated with structural changes. Transformed scenarios in principle differ more radically from the present context than incremental scenarios (i.e. in this sense, the "today's context" needs to be considered as a zero transformation situation). These results invite us to study and reflect in depth the way foresight participants actually deal with future scenarios that diverge greatly from the present context.

6.2.2. Interpretation of findings

As we already mentioned, to generate insights the participants need to position their mindsets in hypothetical future contexts. The analysis of ‘Visions for H2020’ and VERA suggests that the foresight process is actually formed of two sequential approximations or actions with respect to the future: a first approximation is one that positions participants’ mindsets in the future scenario ground (this ground or baseline context is the scenario conceived and offered by the anticipatory phase). In this ground scenario the advisor’s need to position their mind before delivering insights; then, a second step, that exclusively belongs to the recommending phase, consists of the advisor’s exploration of the future horizon from this baseline ground onwards. Only after positioning and exploring, will the advisor be able to propose actions according to the policy problem.

A comparison is useful to better understand the difference between positioning and exploring concepts: while positioning refers to the context where advisors put their ‘feet’, exploring actually relates to where advisors put their ‘eyes’. These positioning and exploring processes constitute the reposition process, which can be found in all human decisions. People decisions are actually influenced by a baseline context (the present) from which humans explore and devise further actions to achieve their goals.

5 note that the term advisor is often used in this thesis to refer to those actors’ participating in the recommending phase of foresight
To summarise, the analysis of VERA suggests that there is a repositioning factor, formed by positioning and exploring sub-factors, that has a strong influence on the outputs of the recommending process (see Diagram 12).

The paragraphs below explain the effects that repositioning has on the advice generated.

Diagram 12 Composition of the reposition factor

**Future reposition factor**

- **Future positioning**
  - Level of transformation of the ground/baseline scenario
  - Influence on the volume and originality of recommendations

- **Horizon exploration**
  - Participant’s freedom to explore future from ground/baseline scenario
  - Influence on the variety of perspectives addressed

**a) Reflections on future positioning**

The level of transformation of future scenarios varies in every foresight exercise. Often foresight is designed to make use of a set of highly transformed visions of future, as well as other scenarios that do not differ significantly from the present circumstances.

The analysis of VERA raw material has revealed that the use of highly transformed scenarios, and more specifically, the reposition of participants’ in highly transformed scenarios with respect to the present, can be used, in principle, to improve the fluency and the originality of the generated insights, i.e. transformed scenarios foster creativity. Transformed scenarios also moderately increase the number of perspectives addressed, i.e. stimulate the creation of more open insights.

In other words, by proposing several transformed scenarios to the advisors for discussion, we could facilitate the generation of numerous and original insights within the debate from different and open perspectives.

Although transformed scenarios are more productive than incremental scenarios, in terms of fluency, originality and perspectives generated, it is also useful to ask participants to position themselves in non-transformed situations. In fact, discussing on the “today's context” (the non-transformed scenario) could be interesting to generate advice more quickly and directly, e.g. waiving further overlapping analysis across scenarios and other sense making related tasks.

**b) Reflections on future exploration**
Apart from the relevance of *positioning* participants in transformed scenarios, the analysis of the case studies has also confirmed the importance that future *exploration* has in the foresight recommendation process. Once participants have ‘positioned’ in a baseline future context, they can be suggested a) to think in a certain direction, e.g. envisaging what could be their strategies according to the expected evolution of the European economy, or how they would react to a future political trend (always taking as an initial context or baseline the ground scenario), or on the contrary, b) to freely explore any other future evolution alternatives according to the preferred themes or perspectives.

In other words, advisors’ exploration may be intentionally either restricted or unrestricted, thus limiting or allowing participants, respectively, to freely explore future horizons and propose whatever aspects and actions they find interesting according to their roles or their perception of the problem.

Restricting (guiding) future exploration could help to narrow the recommending discussions towards the actual project objectives, thus reducing the risk that participants generate dispersed recommendations.

To summarise, a free exploration of the future could open the advising debate to multiple perspectives or angles. The extent to which some of these perspectives are more dominant than others basically depends on the profile of the actors represented in the panel.

### 6.2.3. Application of findings

In the previous paragraphs we have analysed how the future repositioning factor influences the recommending process. Taking into account its components or sub-factors, we could potentially modulate the advice generated with foresight. In this respect, Table 34 presents the effects that both *positioning* and *exploration* have in the recommendations characteristics.

#### Table 34 Influence of future repositioning in the recommendations characteristics

<table>
<thead>
<tr>
<th>Level of creativity (fluency and originality) &amp; openness (flexibility) of insights</th>
<th>Positioning (level of transformation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploration</td>
<td>Low</td>
</tr>
<tr>
<td>Free</td>
<td>1. NON-CREATIVE &amp; OPEN Limited number of insights Conventional insights Open (albeit subject to the roles and disciplines represented in the panel)</td>
</tr>
<tr>
<td>Restricted</td>
<td>3. NON-CREATIVE &amp; FOCUSED Limited number of insights Conventional insights Focused on few fixed themes</td>
</tr>
</tbody>
</table>
Foresight projects sometimes opt to use only the today scenario (discarding any positioning in transformed scenarios) and give autonomy to the participants to explore the horizon flexibly (free exploration), as illustrated in the first quadrant of the Table. This is the case with ‘Visions for Horizon 2020’. Although this approach can facilitate, in principle, an open variety of points of view or perspectives, the variety will depend to a large extent on the characteristics of the participants’ preferences present in the recommending panel. In any case, since in this design the effect of scenarios transformation is absent, the generated recommendations will probably be scarce and have a low level of originality. This design strategy can be adequate for providing a general advice on questions that still require further exploration, or to help advisees to build a preliminary idea of the problem ahead.

The second quadrant represents a foresight design where participants are asked to position themselves in transformed scenarios, and freely explore the horizon in the direction that better reflects their own interests and concerns. This strategy is more likely provide a large number of original recommendations covering multiple perspectives. The approach could be useful for providing innovative alternatives and options to long lasting and well know issues, e.g. policy problems. The activity developed in VERA focus groups reflects this design strategy.

On other occasions, problems do not require multiple alternatives or original solutions. Furthermore, solving the problem may require the advisor to think exclusively in a very precise direction or look at the question from a very specific angle. This case is represented by the third quadrant, which describes an advising process where no future scenarios are utilised (i.e. the baseline scenario coincides with the present context) and exploration is restricted to a very limited perspective or area of knowledge. Medical advice, which requires practical, tested and for-today solutions, is probably the best illustration of this practice.

Finally, some reflections have to be made with respect to the fourth quadrant. It reflects a foresight strategy where participants, once confronted with future transformed scenarios, are invited to think in a very specific direction or talk about the evolution of a very concrete issue, e.g. technological, economic, social, political, ethical aspects, etc.). An example would consist of providing market-related advice based on different plausible future situations, or to give recommendations on the evolution of social media.

6.3. The participatory dimension of foresight

Participation and interaction are essential aspects of collective thinking. As we have already discussed, collective intelligence is often useful to overcome the obstacles that individual thinking encounters when tackling complex problems, and even more importantly, when dealing with future constructions to solve those problems.

The participatory dimension of fully-fledged foresight enlarges the available knowledge base to tackle complex problems, and provide legitimacy to the policy decisions (Miles, 2008).
This dimension was explored in ‘Visions for H2020’ and VERA, and both cases yielded research conclusions.

V2020 facilitated the analysis of an advice discourse elaborated by an exclusive and very concrete R&I actor, top level academics and scientists, with a knowledge domain strongly oriented to Social sciences.

VERA offered the opportunity of studying both the separated and integrated answers of seven different stakeholders, each one representing a different role within the system, in front of the same set of future scenarios.

The section below consists of three parts. Whereas the first one examines the findings obtained in chapter 4 (V2020) and chapter 5 (VERA), the second part explains and interprets these results. The third part presents an application of these results to generate different types of advice.

6.3.1. Examination of findings

The use of discourse analysis in ‘Visions for H2020’ in chapter 4 tried to understand the outcomes of the foresight recommending process, rather than the process itself.

One lesson relates to the influence that the foresight participants have on the characteristics of the final recommendations. As a matter of fact, in V2020 recommendations the influence that the participant’s knowledge domain had on the final advice was clearly discernible. The knowledge domain to a very large extent justified and explained the perception that the participants (elite scientists) had with respect the problem, the argumentation presented, and more importantly, the solutions suggested to address the European problems.

The analysis of these V2020 insights invited us to explore more deeply the influence of the participants profile in the characteristics of the final advice. In this sense, VERA provided a great opportunity to expand the analysis and study, not so much the influence of the participants’ personal domains or areas of knowledge, but more the effects that different participants’ views of the R&I system have on the generated advice, i.e. exploring the influence of participation from the perspective of the advisor’s role within the system.

The analysis of VERA confirmed that the role represented by each R&I stakeholder group also had a strong influence on the themes addressed in their final advice. Thus the influence of participants initially identified in V2020 was confirmed and complemented from the perspective of the position or role that the participants have within the R&I system.

6.3.2. Interpretation of findings

Given the relevance that participation has in the development of foresight recommendations, a specific section on participatory advice was developed in the literature review. We referred there to the sort of attributes that, in participatory exercises like foresight, single individuals bring along (Mitroff, 1983; Sabatier, 1988; Jobert 1989; Scharpf, 1997). The effect of actors’ representation in foresight panels or groups is thus the result of aggregating and integrating all these individuals’ attributes. Drawing on V2020 and VERA findings, these attributes can
be summarised (see Diagram 13) into knowledge domain aspects (related to the actors’ cognitive legitimacy) and roles aspects (affecting the views and perceptions that actors have on personal and social problems. In the next paragraphs both aspects are discussed.

**Diagram 13** Composition of the representation factor

### Actors’ representation factor

- **Actors’ knowledge domain**
  - View of the problem
  - Orientation of insights to preferred areas or disciplines

- **Actors’ roles**
  - View of the system
  - Orientation of insights to preferred themes or perspectives

#### a) Reflections on the actors’ (advisors) role within the system

The use of VERA to analyse the participants’ influence on the advice presented two analytical advantages.

On the one hand, it would allow us to observe and analyse the preferred or favourite dimensions (measured by the number of insights addressing each of the nine ERA themes or dimensions) of very distinct groups of stakeholders when tackling the same European problem. This analysis was favoured by the particular configuration of VERA focus groups. As they were designed around distinct R&I stakeholders (VERA mobilised society, research funders, academics, industry, policy makers, ERA instruments specialists and international actors), it was possible to observe the influence that different actors’ roles, i.e. the actor’s view of the R&I system, had on the advice perspectives. The analysis actually confirmed that the participants’ roles can determine to a large extent the type of themes addressed, i.e. the flexibility of the perspectives recommended to solve the targeted problem.

On the other hand, it allowed us to analyse to what extent these stakeholders’ favourite perspectives or themes were actually reflected in the ‘ERA Open advice’ final report. This analysis showed that by crossing and merging the insights obtained from different stakeholder groups the influence of any stakeholder’s particular opinions was somehow dissipated. The integration and consolidation of the recommendations generated by different discussion groups into a final discourse actually reduced the visibility of those perspectives that tried to put forward actions focused on very specific and narrow stakeholder’s perceptions.
The analysis of the influence of stakeholders' personal domains was not addressed with VERA action research but with V2020 discourse analysis. VERA actually did not consider actors' specific knowledge disciplines when selecting the focus groups participants. The following section analyses the knowledge domain effect.

b) Reflections on the actors’ (advisors) knowledge domain

V2020 discourse analysis identified the effects that the advisors’ perception of the problems has on the characteristics of the delivered recommendations.

The V2020 panel, which was exclusively formed of high level academics and elite social scientists, did not utilise preconceived scenarios, but instead panellists had total freedom to imagine their own future visions. This fact has favoured the introduction in the final advice of preferences related to the participants’ interests, especially based on their field of work and areas of knowledge.

These preferences actually permeated the published V2020 final advice, e.g. the emphasis that the panel put on the potential of Social Sciences to support policy problems, or the insistence on the fact that European problems have to be addressed by inculcating strong values of excellence in policy making, by increasing the participation of an elitist group of social scientists in Politics. This insistence leads us to think on the possibility that group thinking may eventually intensify biases rather than attenuate them (Tindale et al., 1996).

The discourse analysis also served to detect some striking correspondences between the perspectives introduced in the advice and the participants’ curricula. An example of this was a group of recommendations that firmly encouraged the use of data metrics in policy making. The existence of this sort of concrete recommendation in advice discourses (addressing a very particular problem or repeatedly suggesting a very specific solution to general problems) indicates that the panel was unbalanced, with a prevalence of some participants’ areas of knowledge over other participants.

Independently of the instrument utilised to generate the policy recommendations, advice discourses normally try to be persuasive enough so that new recommendations can be taken into account by policy makers and eventually implemented. In this regard, discourse analysis to evaluate foresight advice can be used to detect, among other aspects, when foresight participants aspire to introduce political biases or influence policy agendas that eventually favour their particular knowledge areas. In this regard, Haas (1992) observed that epistemic communities are also susceptible to socio-political influences. Discourse analysis, in general, constitutes an interesting tool to detect advising processes where the problems are contemplated and discussed from narrowed perspectives and when, accordingly, actions are suggested in a very determined direction. In this sense, advice discourse analysis (ADA) can be an effective instrument to analyse the influencing activity and the discourses of lobbies and think tanks.
To conclude this section it is interesting to make some reflections on the possibilities that foresight designers and facilitators have in relation to participants’ knowledge domain. On the one hand, if questions are designed to focus on their knowledge domain, the participants’ contribution could be fully exploited. Wittenbaum and Stasser (1996) noted that achieving homogeneity of knowledge specialisation in panels increases the performance of the group and contributes to reveal ‘hidden profiles’. However, it is important to maximise the contributions of experts without compromising the neutrality of their recommendations. The credibility of advice largely depends on the contribution of ‘knowledgeable’ advisors ((Birnbaum & Stegner, 1979). On the other hand, driving participants’ discussions to other knowledge fields, different to their expertise area, may be useful in getting opinions from different angles. In this case, it is important to avoid this approach leading to the generation of wrong or naïve suggestions.

6.3.3. Application of findings

Table 35 illustrates how the combination of actors’ roles and domains in advising processes explains different alternatives to address systemic problems. As mentioned before, the flexibility of perspectives is a property of human intellect necessary to solve complex problems and it is usually associated with creative persons.

Policy advisors need to view problems with a level of flexibility that permits us to devise solutions from a variety of perspectives. In fact, policy problems are, almost without any exception, complex and interconnected.

Table 35 Influence of actors’ representation in the recommendations perspectives

<table>
<thead>
<tr>
<th>Level of flexibility of the perspectives</th>
<th>Actors’ roles scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited</td>
<td></td>
</tr>
<tr>
<td>Limited</td>
<td>1. LOW Only a very specific part of the problem is considered, and just a very specific area of knowledge is considered for recommending solutions</td>
</tr>
<tr>
<td>Broad</td>
<td>2. MODERATE Although the problem is seen panoramically, only a very specific area of knowledge is considered for recommending solutions</td>
</tr>
<tr>
<td>Limited</td>
<td>3. MODERATE Although only a very specific part of the problem is considered, multiple areas of knowledge are combined to recommend solutions</td>
</tr>
<tr>
<td>Broad</td>
<td>4. HIGH The problem is seen panoramically and multiple areas of knowledge are combined to recommend solutions</td>
</tr>
</tbody>
</table>

The first quadrant corresponds to situations where the problem and potential solutions are to a considerable extent already known. In these cases, it is recommended to restrict the representation of advisory panels to those specific actor roles and areas of knowledge that
can ensure high ‘cognitive legitimacy’ (see Suchman, 1995) to facilitate a concentrated and precise observation of the problem/solutions on discussion.

The second quadrant represents advisory processes that, for solving systemic problems, only contemplate a specific field of knowledge. It would be of little utility, for example, to have only lawyers to give advice on the future of ERA. This is the case of V2020, in which exclusively social scientists (more specifically, Humanities scholars) were mobilised to provide solutions to a very broad and multidisciplinary problem like the definition of Horizon 2020. Relying exclusively on limited areas of knowledge to solve policy problems (i.e. the first and second quadrants) may not only give a reduced view of the problem but also introduce biases in the formulation of final policy agendas.

It may also occur that, once the problem is delimited, the design of the foresight recommending panel only includes one type of actor, while representing a variety of domains, e.g. a foresight workshop composed predominately of research funders educated in a variety disciplines like Humanities, Law, Finances, etc. This situation would be represented by the third quadrant. VERA focus groups adopted this approach so the problem could be studied gradually and separately by different actors.

The fourth quadrant will be better understood if we acknowledge that foresight, in general, faces very broad (and sometimes vaguely defined) policy problems, whose solutions are often generic and systemic. The advice provided with foresight in these cases normally takes the form of high level strategic actions. The VERA project, although attached to the well-defined and recognised concept of ERA, can be associated to these sort of wide problems. Its design is located in the fourth quadrant of the Table, where the voices of actors representing multiple R&I roles and multiple disciplines were heard to reach suitable solutions. Given the interconnections between R&I stakeholders and the complex relation between ERA priorities, it would have been useless that VERA had generated recommendations uniquely based on the opinion of a single R&I actor or with only the participation of social scientists, for example.

6.4. The practical dimension of foresight

In the previous two sections the discussion focused on the contribution of the prospective and participatory parts of foresight to the generation of recommendations. The explanation of these parts gave rise, respectively, to the identification of future reposition and actors’ representation design factors whose associated activities affect the characteristics of final advice. However, the work developed in VERA action research and the analysis of ‘Visions for H2020’ also showed that the final recommendations generated with foresight are very sensitive to other critical activities.

These activities refer to the practical – or policy oriented- component of Miles’ fully-fledged foresight concept. This component assumes the usefulness of foresight to enable a more effective integration of policy areas, and to facilitate stronger linkages between private and public actors (Miles, 2008).
To achieve such integration and linkages, and to make policy makers aware of the real capacity of foresight, foresight advising exercises need to be constructed on solid elicited evidence and reflect this solidness through adequate discourses. In this sense, a practical dimension of foresight means that utilised evidence and delivered messages needs to be compatible and aligned with the type of targeted audience or actor addressed.

While VERA has proved useful to observe the elicitation of evidence from inside, the discourse analysis of V2020 has enabled the study of argumentation aspects which make foresight advice discourses more reliable, consistent and convincing for the audience.

This section consists of three parts. The first part examines the results obtained in chapters 4 and 5. The second part explains and interprets these findings. The third part presents an application of these results to generate different types of advice.

6.4.1. Examination of findings

The reviewing of argumentation theory and practical reasoning literature facilitated the adaptation of critical discourse analysis to the advice discourse, and was the basis for a comprehensive discourse analysis of the V2020 final report.

Almost in parallel, VERA action research helped to understand how future scenarios could be used to elicit the evidence or insights to be transformed into an advice discourse, which was represented by the ‘ERA Open advice report’.

The combination of the two case-studies thus served to understand how the level of intervention of the foresight team in the elicitation and argumentation activities impacts on the characteristics of the final advice.

More specifically, VERA action research has contributed the following learning related to the design of elicitation tasks:

a) insights can be obtained directly or indirectly from participants, i.e. inferred by the foresight team from participants’ perceived opportunities or threats. Inference (creating insights indirectly) is a delicate task risking objectivity in the final advice.

b) the elicitation process can also be designed as an orienting process. It involves developing elicitation activities that could facilitate the production of insights towards a specific direction or seeking some particular types of advice, e.g. facilitators may favour a particular character of insights (e.g. inviting participants to think on the combination of existing actions rather than asking for absolutely new ones) or a particular modality (e.g. by encouraging demand-side rather than supply-side policy-oriented insights).

As for advice argumentation, both cases have contributed to the findings as follows:

a) the work developed in VERA action research has revealed the importance of providing a structured treatment of the insights generated during the elicitation process. This analytical part of the recommending process is critical to advice construction as it gives sense by converting large quantities of ideas into something much more readable and understandable. In VERA this sense-making process included discerning what future-
attached recommendations were also applicable to the present, framing and clustering recommendations into specific dimensions or themes, and making packages (bundles) of insights that could be presented as mutually reinforcing actions. This sense making process was at the basis of the VERA final advice and helped to justify the recommendations included in the final advice report.

b) the analysis of V2020 discourse principally helped to explore how the advice discourse can be articulated and argued to put forward certain ideas more intensively and persuasively than others in the final advice discourse. It also served to confirm the effects that advice fleshing out processes (i.e. making narrative and complementing or removing contents) have in the elaboration and precision of the final advice discourse.

The combined action of sense making and discourse articulation in foresight processes explains why the volume and composition of the final recommendations differs from the number and composition of initial insights (see Table 32 of VERA analysis).

The analyses of V2020 and VERA action research demonstrate that elicitation and argumentation are two foresight activities that serve to define and make real the foresight final advice. In this sense, the tracking of the whole VERA recommending path offered the opportunity to explore where recommendations are generated in foresight processes. The VERA tracking revealed that recommendations emerge in different moments during the foresight process. In particular, about one fifth of the total number of VERA recommendations were generated during the VERA argumentation process (see Table 31). The rest of recommendations were produced, directly or indirectly (one eighth of the total were inferred), by the VERA future scenarios.

The findings above explain, on the one hand, the significant impact that an effective design of elicitation activities has on the participants’ delivered insights. On the other hand, they suggest that the potential of these insights to give rise to a solid and legitimate advice could be wasted if an inaccurate analysis is made or subjective messages are introduced during the subsequent argumentation process.

6.4.2. Interpretation of findings

We have learned from V2020 and experienced in VERA action research that participatory advising processes are fundamentally composed of elicitation and argumentation activities. The elicitation phase evinces the possibilities that foresight facilitators have to align the participants’ insights with the final objectives. A discussion on the role of facilitators is provided later in this chapter.

The elicitation phase provides the groundwork for the following argumentation phase. The argumentation phase is concerned with the process which transforms initial insights into a practical discourse. Being practical in fact means that the advice is applicable in the present context. The argumentation phase therefore needs to make sense of all the elicitation outputs in order to articulate the advice discourse.
While sense making represents the ‘thinking’ part of this argumentation phase, i.e. the creation of ‘intelligence’, the articulation of the discourse represents the ‘persuading’ element, i.e. it aims to convince the audience or the advisees that the proposed actions be considered and eventually implemented. We can see elicitation and argumentation as two necessary steps that jointly constitute a resolution factor of foresight design. When the resolution steps are carried out the advice is completed, thus ending the foresight recommending process. Diagram 14 summarises the constituent elements of this resolution factor. The sections below explain the effects that elicitation and argumentation have on the delivered advice.

**Diagram 14 Interventions associated to the resolution factor**

<table>
<thead>
<tr>
<th>Evidence elicitation</th>
<th>Discourse argumentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inference approach</td>
<td>Sense making:</td>
</tr>
<tr>
<td>Level of deduction of the recommendation</td>
<td>Upgrading, Framing, Bundling of the recommendations</td>
</tr>
<tr>
<td>Orientation</td>
<td>Discourse articulation</td>
</tr>
<tr>
<td>Character and Modality of the recommendation</td>
<td>Structure, Fleshing-out, Rhetoric of the advice discourse</td>
</tr>
</tbody>
</table>

**a) Reflections on evidence elicitation**

The elicitation work is often carried out by facilitators, internal or external, who moderate and orientate the discussions. This orientation can be supported by questions developed prior to the workshop.

During elicitation the participants normally produce many short insights and opinions (e.g. short handwritten notes, electronic files with messages, or audio recorded discussions). It is assumed that the participants will provide a number of direct, though not detailed, messages related to the problem or question. This lack of detail is explained, apart from time related constraints, by the difficulties participants have repositioning their mindset into transformed future contexts. These short insights constitute, however, the seminal and essential material for constructing the completed final advice.

The participants’ concerns expressed through these questions sometimes involves a subsequent intervention by the foresight team to infer advice from those worries or warnings. Other possible use of elicitation questions is to orientate the advice towards specific advice...
modalities or typologies. Both approaches, *inference* and *advice orientation* are commented below.

- **Advice inference**

In VERA some questions were designed to identify critical issues - opportunities and threats - that potentially affect either the R&I actor or the R&I system in each scenario. Drawing upon these critical issues, the inference process consists of devising policy actions that could take advantage of actors or system’s opportunities or alternatively, reduce threats.

The deduction of these actions is a critical activity that requires expertise or specialisation on the topics discussed. Experts are selected among the most experienced participants, who are invited to participate in an additional inference-oriented task or workshop. Inferred recommendations can also be created by an external advisory group. The most common alternative, which was utilised in the VERA project, is that this inference activity is undertaken by the foresight team.

- **Orientation of recommendations to a specific type of advice**

The elicitation activity is designed to encourage the generation of some specific types of recommendation. In principle, this sort of orientation has no negative connotations (e.g. risk of subjectivity) but, on the contrary, it just aims to adjust the advice to the sponsor’s actual requirements.

Two typologies could be in principle used to orientate advice: a) the character of their implementation (e.g. asking for new, recovered, ceasing actions, etc.) and b) their modality or targeted policy objective (e.g. asking for demand-side actions in innovation policy advice, or looking for mitigation actions instead of adaptation ones in climate change policy advice).

Given that including this sort of orientation approaches may enrich the traditional foresight practice, a dedicated section will introduce more detailed examples of these two typologies.

This section has aimed to illustrate how foresight elicitation processes can be modelled to facilitate the generation of participants’ insights. In fact, the elicitation process can be strategically designed to enable an easier analysis of ideas and to facilitate a better structured delivery of policy recommendations.

The transformation of elicited insights into a structured and argued discourse is presented in the next section.

* b) *Reflections on the discourse argumentation*

The argumentation process is the final part of the advice resolution process. Of all foresight activities, argumentation is probably the part that requires more intervention from external teams, e.g. the foresight team or other external group.

It is normally less participatory than the elicitation phase, and consequently its outcomes are much more susceptible to personal criteria and subjectivity.

One of the most important aspects to be considered in the argumentation and articulation of any advice discourse is the necessity of utilising valid, legitimate and solid justifications to
formulate recommendations. In participatory advice processes, such as foresight, these justifications draw on a sense-making analysis of the evidences or insights delivered by the participants.

As a result of sense-making and the subsequent discourse articulation processes the volume and composition of final recommendations may differ from participants’ initial messages. In VERA, for example, similar insights were merged into single recommendations, thus reducing the initial dispersion of ideas (see Table 32).

In the next section sense making and discourse articulation processes are described and analysed.

- Sense-making

Depending on the resources available and the level of analysis that foresight teams self-impose, the sense-making process may become a simple or a complex task. If we acknowledge Davidson and Sternberg’s (1984) conclusions on creativity, mentioned in our literature, we can affirm that sense-making is actually a highly creative process. In general, sense-making is also a highly demanding activity in terms of time and analytical skills.

The sense-making process requires making three types of decisions. The first is related to the procedure used to shortlist those insights that are not only useful for the future but also for the present (upgrading decisions). The second refers to the necessity of clustering insights into different themes or dimensions, so that the articulation of the discourse is made more easily (framing decisions). The third is based on the possibility of including in the final advice not only a relation of recommendations, but also packages of complementing and mutually reinforcing actions (bundling decisions). Below is provided a description of these three decisions.

1. Upgrading insights

The upgrading activity starts once the participants’ messages have been cleaned (removing nonsense and unfocused messages to reinforce alignment with the actual problem sponsors’ like to address) and identical insights merged.

Upgrading is based on the assumption that the future that eventually will happen is, in fact, a combination of several plausible scenarios imagined nowadays.

Consequently, we may consider that all the actions suggested in several future discussions (e.g. those insights mentioned in more than two scenarios) could be, in principle, also suitable and advisable for the present context. Thus, these insights acquire practical relevance and importance, as they are considered potential solutions to existing policy problems.

Although upgrading is normally done by the foresight analyst (mediator), on some occasions additional consultations by experts are required for confirming the today-relevance of some initially future-attached actions (e.g. the symposium hold in VERA Strategic debate 2).
Those insights that, after the upgrading analysis, remain attached to a single scenario (and not applicable or useful for the present context) can be used to provide scenario-specific advice, i.e. recommendations that should be only implemented if a particular future context eventually happens.

2. Framing recommendations

The objective of the framing activity is to cluster the upgraded insights in different topic groups. This is a very important task, as recognised by the EC in the guidelines for communicating research in socio-economic sciences and humanities (EC, 2010b). The EC suggests, for example, gathering recommendations thematically, geographically or institutionally. In VERA the clustering was done thematically, in relation to the new ERA dimensions (see annex 10.4.3).

Although clustering insights into key topics is an analytical exercise that can be done individually by the foresight mediator, it can also be part of the participatory tasks carried out during the workshop.

Some benefits of framing, as learnt during the VERA experience, are:

- By observing and analysing all the insights related to a dimension or topic together, the mediator can get a better understanding of this particular dimension. Thus, it makes an easier identification of internal incoherencies possible.
- The comparison of the volume of insights associated with each dimension helps us identify those dimensions on which the participants have provided more insights (this was actually the foundation of the analysis of participation in VERA in this thesis), or to identify what themes were considered more interesting to debate on. This comparison can be facilitated by a visual presentation of clusters or dimensions, e.g. a spider Diagram. For example, a polygonal approach was used both in ‘Visions for H2020’ and in VERA. By observing the polygons we can learn what dimensions were identified in the foresight exercise and how many recommendations were generated in each of them.
- Finally, framing makes easier and more coherent the elaboration of the advice final discourse. The topics or dimensions addressed can be utilised as a framework that provides a consistent structure to interim or final advice documents, e.g. the use of the nine ERA dimensions in the seven VERA policy briefs and the ‘ERA Open advice’ report.

3. Bundling recommendations

The third aspect to be considered in the sense-making process is the possibility of bundling, i.e. creating groups of recommendations or bundles that can jointly present synergies. These bundles are thus supposed to be stronger and more effective than single actions to solve the policy problem.
Although different bundles were developed during VERA action research (they were put into practice and presented in the ERA Open advice report, as illustrated in the annex 10.4.5), the notion of bundling was actually conceived during the discourse analysis of V2020. It was an answer to reflections in light of the results obtained with the ‘Questionnaire for Visions for Horizon 2020’ (see annex 10.3.2): the evaluation of V2020 recommended actions in that questionnaire (see marks in ‘Results on Visions for Horizon 2020 questionnaire’, annex 10.3.3) revealed that some actions could be more effective to solve the policy problem if they were accompanied by other actions. As a matter of fact, single recommended actions are hardly ever able to give adequate and sufficient solutions to policy issues. Given the nature of ERA and the VERA project, for example, single actions would have been insufficient in relation to their capacity to impact on the ERA process.

Bundling is an innovation in the practice of foresight advice since it represents a new and more efficient solution to provide advice on systemic and multifaceted problems like V2020 or VERA. The novelty of bundling is based on the fact that, although conventional clustering approaches has been sometimes used to group ideas in foresight projects (e.g. the first UK foresight programme) no methodologies have been found in the literature that apply bundling to make a set of complementing and reinforcing recommendations.

The effectiveness of bundling can be explained in terms of 1) its capacity to provide more sound advice than other approaches, 2) the sustainability of its impact, and 3) its design flexibility:

- The capacity of bundling to provide more sound advice

Policy bundles can increase the soundness of single-recommendations advice. In fact, proposing the joint action of different recommendations elevate the level of necessity and sufficiency of the solution because it reduces the range of alternative options while augmenting the capacity to solve the problem. The feasibility of the advice is also reinforced with bundling, as far as many actions can be better implemented if, in parallel, they are complemented with other accompanying or supporting actions. A smart combination of actions also serve to counteract the negative collateral effects that could eventually bring about the implementation of single ones.

- Bundles and the sustainability of actions impact

Bundles also favour the sustainability of the policy action impact. Given that an effective design of bundles would include mutually reinforcing and complementary actions, the durability of the impacts could be more easily achieved.

- The flexibility of bundle design

Bundling also serves to look at systemic problems through different lenses. In VERA, for example, three bundles reflected three particular perspectives for addressing the ERA issues. Each bundle actually targeted the ERA problem with a different policy orientation,
thus giving respectively more emphasis to excellent science, industrial leadership or societal challenges (see annex 10.4.5).

Note, however, that the simultaneous implementation of different bundles would, in principle, demand a broader availability of resources. Furthermore, as every bundle tackles the policy problem differently, the implementation in parallel of several bundles would require a detailed analysis of the compatibilities between their included actions. Actions can also be differentiated within the bundle. In the VERA bundles, for example, each action was labelled and distinguished by their contribution to the whole package, e.g. the actions in VERA bundles had an enabling, leading or supporting function (see annex 10.4.5) to solve the problem.

As mentioned above, sense-making precedes the discourse articulation phase in the argumentation process. After sense-making, foresight mediators normally have a collection of upgraded (present-relevant) insights, which are framed around some specific themes or dimensions. On some occasions, these insights could also be grouped as bundles. These analysed and treated insights are the most important material the analyst or mediator has to begin to articulate the advice discourse. This articulation is described in the next section.

- Discourse articulation

After finishing the sense-making phase mediators normally start the discourse articulation process.

As discussed during V2020 discourse analysis, the elaboration or articulation of the advice final discourse is a critical part of the foresight recommending process.

As a part of VERA action research a high volume of elicited insights were transformed into the ‘ERA Open advice report’. This required an intense exercise of interpreting and enriching participants’ ideas. This phase is the final step on a long path that had started with the recommendation focus groups receiving future scenarios.

The study of VERA and V2020 has allows us to find out what key components are behind the discourse articulation process. Firstly, a structure or skeleton is designed in order to enable the discourse articulation. Secondly, the fleshing-out process, which consists of providing a narrative that connects insights, thus adding complementary contents, or making further reflections (i.e. providing a body to the discourse). Finally, a third activity relates to the use of elements that increase the persuasiveness of the advice, i.e. making the final advice more attractive and convincing to the audience. In the next section we will describe these three aspects.

1. Advice structure

There are two basic decisions to take in relation to the structure of the advice discourse. One decision is based on the structure rigidness. It means deciding whether the discourse will have to be strictly adjusted to some preconceived parts or, if the narration can be free and
not bounded to fixed sections. The second decision is related to the presence of recommendations throughout these sections.

The ‘ERA Open advice’ report is an example of a rigid structure articulated around the nine new ERA dimensions (other criteria often used for structuring foresight reports are, for example, the sponsor’s specific objectives, main challenges, technology, economy, social, political sections, etc.). Rigid structures are normally useful to present advice on very complex and systemic problems, where numerous and interconnected themes need to be considered. By contrast, the V2020 discourse, in spite of being also structured around six specific sections (see Table 7), presents a more free and flexible reading.

As for the presentation of recommendations, there are also differences between VERA and V2020. In ‘ERA Open advice’ report the recommendations are explicitly listed in a dedicated section (in the annex). This helps to understand the big picture from different angles or dimensions and connect suggested actions. In V2020, however, the recommendations are inserted in the text and dispersed across the discourse. Some VERA policy maker participants suggested that, independently of being dispersed throughout the discourse, policy recommendations should be extracted and presented separately in a very simple and straight-forward way, e.g. policy briefs or concise advice-summary brochures.

2. Flesching out

During the fleshing-out process those ideas generated in the elicitation phase, and analysed in the sense making process, are connected and enriched with contextual references, related literature and new contents. This process is usually carried out by the foresight coordination team, e.g. VERA. On only a few occasions is fleshing-out started by the panel itself, where a preliminary or interim report can then be made by a representation of foresight participants, as in the case of V2020.

The overall objective of fleshing-out is to justify the usefulness of participants’ recommendations with additional supporting premises and clarifications so that the delivered advice will eventually be more coherent and consistent.

From the direct observation of VERA and the analysis of V2020 discourse some specific objectives of fleshing-out have been learnt: 1) the reinforcement of the alignment between the advice and the sponsor’s actual objectives, 2) the refinement of some participants’ messages, and 3) the consolidation of advice contents.

- Reinforcing alignment

Alignment refers to the capacity of the advice to have a positive (large or moderate) impact on the objectives. In the literature, Basu (1997) identified ‘wrong advice’ with the absence of this alignment. It also means that the level of advice offered (e.g. strategic, medium, or operational advice) matches the level required by the sponsor.

Although the elicitation (facilitator orientates discussions to the sponsor’s problem) and the sense-making phase (elimination of unfocused insights) already contribute to align
the participants’ recommendations with the receptor objectives during the fleshing-out process this alignment is reviewed and reinforced.

To reinforce alignment, the fleshing-out team normally has to introduce complementary recommendations. It could be found necessary, for example, to make more emphasis on certain policy aspects, or introduce some messages for covering gaps, thus adding missing ideas that are relevant for the advisee without changing the orientation of the advice proposed by the participants. Enriching advice can more effectively align the foresight messages with the sponsor’s aimed transformations (see Pooper and Teichler, 2011). In VERA this advice enrichment was not observed to have affected the overall message or interfered with the participants’ main recommendations.

In other occasions, it is not necessary to add new ideas to achieve alignment but, on the contrary, to merge different participant’s initial insights into more concentrated messages.

As a result of adding and merging ideas, in participatory processes the composition of final recommendations generally differs from the original number of elicited insights (see Table 32).

- Refining participants’ messages

The analysis of the case studies confirmed that the fleshing-out is actually a very sensitive part of the whole foresight project. This is based on the fact that during the process some participants’ insights need to be reinterpreted by the foresight mediators, with any consequences this may have in terms of possible misunderstandings.

It is sometimes also difficult for the analyst to understand and then justify in the discourse some controversial or radical recommendations. In this respect, a very interesting example of refining or ‘softening’ the panel’s initial advice can be found in the V2020 case. An initial draft recommendation that advocated the “independence of researchers” from short-term economic and political interests, putting also into question the benefits of linking academy with industrial oriented research, was actually replaced by a (very different) ‘Education and Training’ section focused on the necessity of making research careers more attractive, emphasising the benefits of improving the communication of research outcomes, and underlining the importance of training ‘in the development of research policy and agendas’.

- Consolidation of contents

The VERA fleshing-out process tried to build a complete as well as a specific policy advice. Observation of the VERA process lead to an understanding that completeness and specificity are two different concepts.

A piece of advice may actually be complete in relation to the number of aspects addressed to solve the problem, but unspecific because these aspects are very vaguely or generically described. In this respect, the VERA discourse tried to answer, as far as
possible, to what (explicitly recommended action), where (geographical scope), how (instruments, means), when (time plan), who (implementing actor) and whom (targeted actor) questions. In principle, answering these questions would allow policy makers to comprehensively address the problem. However, policy makers also need these answers to be specific, as explained below.

Specificity actually avoids the vagueness of the recommendations. It means ensuring that recommendations are precise enough and have the right level of detail so that the recommendation could be implemented in practice. Specific and precise advice is usually associated with correct decisions, as suggested by Rantilla (2000). The specificity of advice is also explicitly required in social sciences and humanities research communication (EC, 2010b).

From the analysis of the case studies we can find fleshing-out either as a reliable and necessary process whereby the advice is duly aligned, refined and consolidated or, on the contrary, as a critical and potentially distorting activity that can transform participants’ insights into an advice that includes personal or preconceived conclusions and perspectives.

3. Persuasiveness and rhetoric

Advisors sometimes make use of some instruments to increase the level of persuasion of their discourses. These strategies of persuasion normally aim to reinforce the strength of the messages articulated, i.e. making them more convincing for policy makers.

One manner to convince policy makers on the usefulness of the recommendations is to provide figures and evidence gathered during the collective discussions, e.g. number of stakeholders that advocated some specific action, number of scenarios where the action is claimed (an example of this can be found in the list of recommendations presented in the annex of the ‘ERA Open advice’ report). This normally increases the legitimacy of the messages and makes the advice more reliable for the receptor. According to Chaiken (1980), the credibility of sources influences the grade of persuasion of advice.

Another instrument of persuasiveness is the utilisation of examples. Exemplification is very useful, for instance, to convince the audience on the action implementation feasibility, e.g. showing how similar actions are successfully implemented in other countries or by other actors (best practices) (e.g. some references to China policy initiatives are used in V2020 to support European related recommendations).

Getting external endorsements is also a very efficient way of elevating the strength of our recommendations. The endorsement of our recommendations can be obtained from foresight participants themselves, like in the ERA Open advice report, or from other prestigious and influential experts. Disseminating draft results to some selected experts can be an interesting practice to involve them in earlier stages and eventually get their endorsement or approval.
Finally, other persuasion strategies opt for declaring the consequences of recommended actions. A very frequent one consists of explicitly (and somehow reiteratively) presenting and reminding of the positive consequences that the implementation of actions would have. Other one, which has a more rhetorical nature, involves the acknowledgment of negative consequences or collateral effects of actions, i.e. recognising the negative impact that for the receptor the action may have in other areas, e.g. economic, social, ethic, etc. This second strategy, although it is not very frequently used in policy advice (only few examples of its utilisation were identified in the V2020 discourse analysis) is considered a powerful instrument of persuasion used by politicians to elevate the level of sincerity of their discourse.

6.4.3. Application of findings

In the last sections we have described two components of the advice resolution process that have emerged during VERA action research and V2020 analysis: elicitation and argumentation.

Both components have in common the necessity of external intervention, either the foresight team or other external actors. In this respect, Table 36 tries to analyse how the level of intervention during the elicitation and argumentation processes influences the level of elaboration of the final advice.

**Table 36** Influence of advice resolution in its level of elaboration

<table>
<thead>
<tr>
<th>Level of elaboration of advice</th>
<th>Elicitation (level of intervention)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
</tr>
<tr>
<td>Argumentation (level of intervention)</td>
<td><strong>1. BRAINSTORM</strong> Non-elaborated advice. A relation of untapped ideas is generated through a very flexible elicitation and open method. The integration of these insights is not analysed. There is an absence of discourse.**</td>
</tr>
<tr>
<td></td>
<td>High</td>
</tr>
<tr>
<td></td>
<td><strong>2. RECOMMENDATIONS LIST</strong> List (no discourse) of focused and precise recommendations, many of which have been deeply analysed and inferred from participants’ concerns.**</td>
</tr>
<tr>
<td></td>
<td><strong>3. NARRATED BRAINSTORM</strong> Attempt to justify, through a elaborated narrative, those loose and untapped ideas resulting from an unstructured elicitation process.**</td>
</tr>
<tr>
<td></td>
<td><strong>4. ELABORATED ADVICE</strong> Precise and detailed advice. It is based on a smart elicitation strategy, with a balanced deduction of advice from participants’ messages. The discourse provides adequate and structured contents supported by a consistent argumentation.**</td>
</tr>
</tbody>
</table>
The first quarter of Table 36 represents those recommendations generated with highly unsystematic (or even inexistent) elicitation and argumentation processes. Adopting so flexible and open an elicitation approach means that participants’ insights could be unfocused or imprecise. In addition, argumentation is not possible because there is not even a sense-making activity supporting the process. As a result, the advice would be just a collection of brainstormed ideas.

The second quarter reflects a situation where the participants’ insights have been elicited in a very structured and oriented manner, and with a right level of inference analysis. The results, however, are not supported by a narrative that provides supporting contents or to describe the connections between recommended actions. The advice, therefore, takes the form of a mere recommendations list. Some policy makers have suggested that, although this type of presentation is very practical (e.g. recommendations can be included in a separated brochure), it is preferable that foresight main advice consists of a complete and fully argued report.

The third quadrant can be seen as an attempt to articulate or wrap up a number of loose and probably unfocused insights around a consistent narrative. Providing a convincing argumentation to the discourse usually becomes a very difficult task in these cases insofar as the elicited insights, although probably being relevant, may be oriented to many dispersed themes or targets.

The last quadrant describes an elaborated advice that has been built, with a consistent argumentation, from a set of structured and well oriented insights. The extent to which new contents and persuasive elements are added and used in the narrative is basically a decision of the foresight team, and normally depends on the targeted audience, the type of policy problem, or the advice receptor’s characteristics.

### 6.5. Foresight recommending factors

In the last sections we have specified fully-fledged foresight concept from the perspective of the foresight recommending phase. The analysis has served to identify three RRR factors – *reposition, representation and resolution* - that explain the advising process.

Table 37 summarises the identified foresight recommending factors and sub factors. It also includes those parameters that can be taken into account for eventually achieving specific advice characteristics.

The contextual circumstances that surround every foresight project, such as the advisee’s profile, availability of resources, political momentum, etc., justify different combinations of these factors during the advising process. These factors can eventually induce or modulate the characteristics of the advice required by these circumstances. Some implications are summarised in Table 38.
Table 37 Factors influencing the foresight recommending processes

<table>
<thead>
<tr>
<th>Factor</th>
<th>Sub-factor</th>
<th>Concept</th>
<th>Design</th>
<th>Impact on advice</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positioning</td>
<td>Level of transformation of the ground scenario</td>
<td>High (or low) transformation of scenarios</td>
<td>The level of transformation of the scenario where participants are asked to ‘position’ themselves (baseline scenario) has direct influence on the <strong>volume</strong> and <strong>originality</strong> of the recommendations generated.</td>
</tr>
<tr>
<td></td>
<td>Exploration</td>
<td>Freedom to explore visions from the positioning scenario</td>
<td>Restricted (or free) exploration of the future</td>
<td>The participants’ freedom for exploring horizons (from the baseline scenario) has some influence on the number or <strong>variety of perspectives</strong> (flexibility of themes addressed by the advice)</td>
</tr>
<tr>
<td></td>
<td>Roles</td>
<td>Participants’ view of the system</td>
<td>Selecting participants’ <strong>functions</strong> within the system</td>
<td>The balance of actors’ roles and knowledge domains in the recommending panels has a direct influence on the <strong>perspectives</strong> or themes addressed in their advice</td>
</tr>
<tr>
<td></td>
<td>Domains</td>
<td>Participants’ view of the problem</td>
<td>Selecting participants’ areas of <strong>knowledge</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evidence</td>
<td>Level of intervention in elicitation</td>
<td><strong>Inference</strong> (use of critical issues) <strong>Orientation</strong> (type of advice: character, modality of advice)</td>
<td>The level of intervention in the elicitation has direct influence on the <strong>type</strong> of recommendation generated</td>
</tr>
<tr>
<td></td>
<td>Discourse</td>
<td>Level of intervention in argumentation</td>
<td><strong>Sense-making</strong> (upgrading, framing, and bundling decisions) <strong>Discourse articulation</strong> (structure, fleshing out, and persuasiveness)</td>
<td>The level of intervention in the argumentation has influence on the level of <strong>elaboration and precision</strong> of advice</td>
</tr>
</tbody>
</table>

Some advisees, for instance, may find useless very original and creative insights if the consequences of a wrong advice are very significant (e.g. health related decisions). In these cases the use of highly transformed scenarios would not be necessary.
As for flexibility and openness of perspectives, some policy makers may be interested in obtaining advice from a very specific community, in which case the exercise would be better represented by only a very concrete type of participant (e.g. the V2020 case study).

Table 38 Modulation of foresight recommending processes

<table>
<thead>
<tr>
<th>Design factors</th>
<th>Reposition</th>
<th>Representation</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Advice profile</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 1 1</td>
<td>Numerous, original, flexible recommendations and a highly elaborated advice.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 1 0</td>
<td>Numerous, original advice, addressing multiple perspectives, although with a low level of elaboration.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 0 1</td>
<td>Numerous, original and elaborated advice, although focused on a very limited number of perspectives.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 0 0</td>
<td>Numerous and original recommendations, oriented to a very specific or limited perspective, and weakly elaborated.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 1 1</td>
<td>Flexible and elaborated advice, but neither numerous nor original.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 1 0</td>
<td>Flexible advice, with multiple perspectives discussed, although with a low level of elaboration. The number of recommendations is very limited and the advice has not a high level of creativity.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 0 1</td>
<td>Well argued and elaborated advice, although consisting of a short number and not very original recommendations, and focused in only a very limited number of perspectives.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 0 0</td>
<td>A non-elaborated list of standard or conventional recommendations, which are focused in only a very limited number of perspectives.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In other cases, the urgency of the sponsor and the contextual conditions are strong reasons to design a foresight project where the level of elaboration and argumentation only play a very small and limited role, thus only a list of recommendations would be requested. In fact, policy makers very frequently do not require numerous and elaborated ideas from foresight projects, but a limited set of highly focused and direct messages.

This section has summarised the influence of three RRR factors – reposition, representation and resolution - on foresight recommending process. The combination of these factors is relevant for the practice of foresight insofar as they can enable foresight practitioners to anticipate the design that could give rise to the sort of advice that it is required according to the sponsor's objectives or the project circumstances.

The last section of this chapter presents a reflection on how these recommending factors can be eventually adopted and understood by the main foresight players.
6.6. The roles of foresight players in the generation of advice

On our case studies analysis (chapters 4 and 5) and during the identification of factors affecting the foresight recommending process (previous sections of this chapter 6) we have very often referred to sponsors, participants, facilitators, and foresight moderators’ activities and interventions. The discourse analysis of V2020, together with the observation of the VERA action research, justify a final section in this chapter that summarizes these players’ interventions and presents a critical discussion on their roles and the influence they have on the generation of sound recommendations.

To keep the discussion aligned with the results (factors RRR identified in foresight recommending processes) presented in previous sections 6.2, 6.3, 6.4 and summarized in Table 37, the reflections on the present section will address issues related with players’ observed behaviours with regards to the anticipation of future (in particular futures reposition), aspects related with mobilisation (in particular the actors’ representation in the discussion panels), and questions related to the final preparation of foresight outcomes (i.e. the advice resolution).

6.6.1. Reflections on the role of foresight sponsors

Despite the existence of multiple future anticipation tools (Popper, 2008a), foresight sponsors very frequently and explicitly demand the use of future scenarios in foresight projects. Although exploring how socio political or technological contexts can evolve in the future is actually a highly creative task that, in general, makes foresight projects more ‘attractive’ than other participatory projects, scenarios are also effective drivers to convey sponsors’ specific agendas and political messages. In other cases, the use of scenarios is merely anecdotal (i.e. utilising scenarios as an excuse to launch debates, or just as an imperative to label such a debate as ‘foresight’).

What is often, and unfortunately, overlooked by sponsors is the usefulness of scenarios for stimulating the generation of recommendations and eventually shape futures. This is why their influence - more specifically the modulation effect that their level of transformation has on the originality and fluency of ideas as identified in this thesis - could notably change the conception that sponsors have about scenarios utilisation. As discussed in 6.2.3, sponsors may be interested in obtaining only a limited grade of originality in the insights, or just aiming to get a reduced number of ideas (see Table 34), so it is important that foresight practitioners make sponsors aware of these scenarios modulation possibilities.

From a "critical systems" perspective (Ulrich, 1983), foresight sponsors are a source of motivation. There are obviously other ‘inspiring’ reasons (for example, the altruistic pursuit of solutions to socioeconomic or environmental problems), but in any case systematic work for these objectives will usually demand material resources supplied by one or other sponsor. As a consequence, sponsors may be tempted to exert their power and try to influence actors’ representation in the process, by shaping the selection and mobilisation of particular actors (people or institutions) and thus eventually becoming a source of control. The influence that
participants' knowledge domain and their roles within the system have on the advice flexibility and themes addressed could be used by foresight designers and sponsors to devise projects where problems will be predominately observed from very specific angles. In fact, it seems reasonable to give more weight to some knowledge areas than to others in workshops, in order to capture particular perspectives (e.g. inviting medical experts in workshops that aim to obtain a purely medical viewpoint of urban pollution issues).

It is therefore recommended that sponsors and moderators will jointly address issues concerning the mobilisation of actors. Sponsor’s expectations and actors’ representation in the workshops should be balanced during the scoping phase of foresight. In any case, adjustments in the participation of actors, e.g. incorporating new participants or experts suggested by the sponsor to reinforce specific areas of discussion, may be also considered along the process.

A selective incorporation of high profile experts and accredited academics in the discussions is well accepted by sponsors: they find the participation of scientific elites to guarantee that foresight results will have adequate levels of cognitive legitimacy (cf. Suchman, 1995). The participation of sponsors themselves (very frequently sponsors are policy makers) in the foresight project (not only in workshops but also in the internal discussions with moderators and analysts) can also be used to better articulate recommendations with ongoing policy processes.

In general, sponsors’ ultimate objectives are pervasively considered and targeted throughout the whole foresight process (when they are not, this may be a recipe for failure). Acknowledging sponsors’ rationales enables facilitators, for instance, to guide participants more efficiently, during the elicitation stages, towards the type of actions recommended. They may be encouraged to consider, for example, devising radical new actions, focusing on ceasing actions, proposing supply-side or demand-side actions, etc. Sponsors’ preferred areas of work may also induce the utilisation of particular frames during the clustering and sense-making process.

As foresight clients, sponsors have influence, directly or indirectly, on the discourse preparation. Specific requirements on the report structure (e.g. this was the case in V2020), the introduction of specific cases to illustrate and support arguments, the grade of elaboration or precision of the recommendations, or the construction of bundles of recommendations, are some examples of this direct influence. Sometimes sponsors are even invited to take active part of the discourse preparation, just in terms of preparation of prefaces, endorsements, introductions, or even the presentation of other forthcoming projects.

Indirectly, and certainly very strongly, aspects like sponsors’ authority, their position in the political context, power, urgency and their expected impact of results (as identified in the V2020 case) have effects on the discourse articulation and argumentation strength. For example, the relevance and importance of the problem addressed could lead sponsors to
demand more persuasive analysis. In terms of advice, foresight cannot be neutral (providing a balanced account of recommendations implies that other options are ruled out) - but it has to be objective. Objectivity is a must throughout the foresight process so as to faithfully reflect the participants’ opinions. The discourses articulated from these opinions have to be compatible with sponsors’ requirements while ‘speaking the same language’ than the targeted audience.

6.6.2. Reflections on the role of foresight participants

According to this research, the generation of insights by participants can be stimulated by the utilisation of highly transformed scenarios. To activate this effect it is necessary that participants are able to reposition their mindsets into these hypothetical future contexts. This can be more easily achieved when participants are ‘trained’, i.e. accumulate experience from other foresight projects. Future repositioning demands from participants an adequate understanding of scenarios before starting the participatory discussions. In this respect, involving participants in both future anticipation (creation of scenarios) and recommendation phases will place them in a better position to discuss scenarios with which they will be already familiar. As for desirability of scenarios, research findings showed that participants’ preferences do not influence the advice characteristics (see section 5.4.2).

It is no exaggeration to say that foresight participants are the most relevant players within foresight processes, not least because they often constitute, simultaneously, a source of knowledge and legitimacy. The influence of participants’ representation in the recommending process was analysed in section 6.3. Perhaps it is worth adding that the participants’ role as scenario users is not only manifested by their future repositioning ability, but is also and strongly related to their personal attributes and attitude in front of these futures, as suggested in the V2020 analysis. Participants’ knowledge profile and position within the system were identified, in previous sections, as variables that explain why some perspectives or themes receive more attention than others. Participants’ behaviour and interaction, e.g. emerging leaders in discussion teams, normally have positive effects in the group dynamics, thus making the facilitators’ tasks easier.

The degree of intervention that participants have in the preparation of foresight final discourse is other decision that moderators need to take during the scoping/design phase of the project. This decision may be taken in conjunction with sponsors. In this respect, and for the sake of advice objectivity, sponsor’s requirements about the participation of some particular experts or members of their own organization should be openly discussed and justified.

Some comments are also relevant in relation to the role of participants in pursuing right levels of soundness. Based on our empirical observations, during the elicitation of ideas and the final discourse argumentation, participants and foresight moderators, respectively, are either inclined to adopt a logic of consequentiality, i.e. rational judgement of recommendations, or a logic of appropriateness, i.e. advice driven by tacit knowledge and
intuition (March and Olsen, 2004). Given that soundness is essential to guarantee the strength and the rational correctness of advice, it seems important for participants to play an active role during the discussions trying to debate (with the support of facilitator) why, and to what extent, actions are actually necessary, sufficient, feasible, or counterproductive. If tests of soundness cannot so directly and explicitly be carried out in the workshops, at least the preliminary recommendations could be shared with foresight participants (e.g. the VERA team distributed interim policy briefs), so that they can personally evaluate the strength and objectivity of advice, and endorse or reject the synthesised messages.

6.6.3. Reflections on the role of foresight facilitators

To exploit the full potential of participants in foresight projects, the facilitators need to have a profound understanding of future scenarios. The assistance of facilitators can enable participants to more easily "reposition" their mindsets in the proposed future contexts. Some facilitators’ abilities and skills, like imagination, motivation, thinking agility, and empathy, are useful in this repositioning process. An additional difficulty is given by the fact that foresight projects very frequently use more than one scenario, which implies that facilitators have to sequentially ‘move’ participants' thinking from one scenario to other different ones, thus avoiding fixed discussions on the same future context. This is actually not an easy task as far as adapting human reasoning to different and various contextual circumstances demands an intensive exercise of abstraction.

The facilitators’ area of expertise or background does not always correspond or with participants' knowledge domain. Tackling this (very common) situation implies a much more intensive, ad hoc, and anticipated preparation of facilitators. A practice worth further examination may consist in the elaboration and utilisation of predefined questions, ice-breaking messages, glossaries, related news and lists of key topics.

Facilitators have also to deal with potential controversies. Placing people in front of some particular scenarios can give rise to discrepancies between participants' views. Value-laden and provocative contexts stimulate lively debates (which does not mean at all that the discussion will produce practical and sound recommendations). The facilitator needs to have conflict resolution skills and find ways of moving discussions, especially where these concern responses to signals of a scenario developing. In this respect, Bonaccio and Dalal, (2006) have discussed the influence that leaders and hierarchies have in discussion groups, which have to be adequately managed by the group facilitator. Dufva and Ahlqvist (2015) have demonstrated how, in practice, facilitation affects the discussion flow, e.g. by focusing on points of agreement (out-of-radar knowledge). They also wonder whether radical ideas (out-of-radar knowledge) may be induced not only by the imagination of participants but by robust foresight methodologies (ibid.)

Facilitators’ duties also include analysing in advance the participants' profile (especially their knowledge domain and the role they play within the analysed system) and the actor constellations present in the group, e.g. identifying potential tensions or alliances between
the organizations that participants represent. Being aware of participants’ locations within what (Mitchell et al. (1997), termed the Salience Model which involves characterising and classifying participants in terms of urgency, legitimacy and power issues, should help in the management of group dynamics and achievement of collective results. In addition, the observation of workshops in the VERA case confirmed that alongside the facilitators’ ability to manage participants’ conflicts or synergies within the group, it is important to distinguish between those opinions prompted by individual preferences, from opinions anchored to social or common interests (the ERA community in the case of VERA), or from opinions attached to purely intellectual concerns. (which is to a very large extent aligned to the points made in Suchman’s legitimacy literature).

Facilitators are key players in foresight processes and represent an important source of control. Through the facilitation action, both sponsors’ objectives and designers’ procedures (conceived to target these objectives) crystallize and take the form of articulated knowledge (Dufva & Ahlqvist, 2015). The smooth running of workshops, with appropriate implementation of methodology, and thus the quality of the final results, all largely depend on the adequate and effective work of facilitators (if not exclusively on facilitators - individual participants and immediate contexts can play decisive determining roles). Facilitators need to have a comprehensive picture of the entire project process: in this way their activities will be better aligned with, and favour the realisation of, complementary foresight activities. For example, a particular clustering or labelling of ideas during the elicitation task, the pre-elaboration of bundles, or the elaboration of preliminary arguments by participants, can assist and make analysts and moderators’ subsequent argumentation tasks easier.

Finally, in relation with advice quality and strength, it is important to embed the notion of soundness (as aforementioned and described in this thesis) in the facilitators’ action. Assuming that foresight is eminently practical is the first step to understanding that foresight recommendations also have to be sound. Facilitators have much more opportunities than other players to increase the quality and soundness of the recommendations during the elicitation process, e.g. by asking questions like “are you sure that there are not other possible alternatives?”, “what other actions would you implement to make your recommendation more feasible?”, “could you guarantee that this specific action would not be eventually counterproductive in the long term?”. By introducing such questions in the elicitation process, we are basically injecting convergent, logical or rational thinking into a foresight process which is inherently creative and divergent.

6.6.4. Reflections on the role of foresight moderators

The findings of this thesis enable foresight moderators to have higher control of foresight recommending processes. It has been empirically proved that future scenarios may actually become useful instruments of modulation, at least in terms of fluency and originality of advice. We can even claim that the level of transformation of scenarios emerges as a new variable that, if well adjusted, can induce more abundant and creative insights (see Table
34). Beyond assuming that scenarios are good presentational devices to show that aspects of the future are open, it is also important that moderators help sponsors to understand that future scenarios in particular, and foresight in general, is a means for taking decisions that affect an extended present. This moderators’ role is crucial insofar as the use of scenarios in foresight is very often misunderstood by foresight outsiders. On these conversations moderators and sponsors have to decide on questions like the grade of elaboration and ‘ornamentation’ of scenarios. Although exhaustive scenario descriptions can provide varied themes for debate, they could unintentionally also lead to participants’ discussions deviating from sponsors’ specific areas of interests. One moderator’s common practice consists of stocktaking completed foresight projects so as to learn from past experiences. In this sense, an interesting exercise for moderators would be to compare to what extent particular scenarios have been more stimulating than others.

While recognising the effectiveness of existing foresight methods, new approaches are needed that enrich foresight practice. Moderators encourage people to think differently through the course of the project. Paradoxically, this sort of divergent thinking is often missing in the moderators’ practice. In other words, we may claim that not only ‘innovation foresight’ (foresight for gathering innovative ideas) is important but also ‘foresight innovation’ (innovating on the practice of foresight) deserves academic attention.

Similarly to the relevance that moderators’ expertise and preferences has in the definition of scenarios we have also to recognise the high influence that moderators have in the mobilisation of system actors in foresight projects. This thesis proposes using the knowledge domain, and the actors’ role within the system, as key parameters to guarantee flexibility or balance of perspectives. But although actor or stakeholder analyses are recommended as means to establishing discussion panels fully compatible with the problem addressed, in practice, due to urgencies or other practical matters, many foresight moderators recruit participants who have already (sometimes reiteratively) taken part in past processes. Beyond raising concerns of legitimacy (and excluding political or other biases), such practices may be questioned by the intellectual ‘endogamy’ they imply. A dynamic foresight that assesses participants’ contributions (Miles, 2012) would help in this respect. Diversity of messages, which is a major contribution of collective thinking processes to avoid clichés and commonplaces, is favoured by the interaction of multiple people. Perhaps, the utilisation of highly transformed scenarios (repositioning these people on them to think differently) is the solution that foresight has, in contrast with other intelligence instruments, to pull advisors out from their preconceived agendas or mindsets and thus counterbalance such endogamy or reiteration in the participation.

Moderators’ or analysts’ intervention in the elaboration of policy advice is not exclusively a matter of concern in foresight projects. The problem actually arises in any other participatory advising process. Doubts on subjectivity are justified as far as the responsibility of moderators, in general terms, should basically be to transmit an impartial interpretation, synthesis, and presentation of multiple participants’ insights to the wider audience,
sometimes also pointing out participants’ areas of disagreement. The task is even more complex if we take into account that, in the case of foresight, these insights emerged from debate about various hypothetical contexts of future.

These sorts of issues were present in the VERA project, and it is worth observing that specific approaches to ensure the legitimacy and quality of the process included to collectively agree (with other VERA partners) the advice report structure and style, to implement a peer review process to correct and collaboratively give shape to the advice discussion, and, most importantly, to share different interim reports with each of the seven workshop groups, and with partners, so as to improve the process transparency.

Methodologically, the utilisation of bundles in foresight processes, as described in VERA, also contributes to reduce the risk of partiality. Detecting (from the participants’ insights) the most important topics to focus on (i.e. the nine dimensions conceived in VERA, and graphically presented as vertices of a polygonal frame) and populate them with specific recommendations, is essentially a way of guaranteeing that the final advice will have no thematic gaps - to ensure that all relevant themes are correctly addressed. Although the precise techniques applied by VERA may not be applicable in all cases, the general principles of quality and transparency that inform them should be.

One factor, observed through action research, that also highlights the objectivity of the VERA moderators, is the absence of disagreements or discrepancies (from the participants involved in the VERA process) about the veracity of the conclusions reported in ‘ERA Open Advice’.

Finally, another very important moderators’ role in foresight processes deserves attention, as it directly goes to the heart of foresight. This role is better understood if we accept that foresight recommendations do not have to be uniquely produced as a result of the existence of scenarios. A detailed observation of foresight processes would actually permit us to identify where recommendations can be actually generated (as illustrated in Table 31). Moderators can play in this regard a relevant role - they can ‘steal the show’ from scenarios, favouring and complementing debates with scenario-detached discussions, which in turn may give rise to equally sound recommendations.
7. REFLECTION ON FORESIGHT RECOMMENDING PROCESSES

VERA has shown how foresight participants in practice contribute to the generation of advice. The VERA policy recommendations were articulated around a structured foresight methodology. The analysis of this process served to make evident the potential of the collective to provide intelligence to policy processes. More specifically, the study contributed to identify in chapter 6 those factors - Reposition, Representation and Resolution (RRR) - and sub-factors that play a critical role in foresight recommendation processes. Drawing on these factors, the present section provides an overall conceptualisation of the foresight recommending process.

The first section of this chapter explains how these factors are sequentially related in the recommending process. The second section describes the connection of the anticipatory phase of foresight to the recommending phase through a schematisation of the transitions (or what we can call evolutions) occurring alongside the fully-fledged foresight processes. The third section presents complementary insights on new typologies of foresight advice, based on the discourse analysis (V2020) and action research (VERA) experience. The last section presents results of some interviews with experts whose reflections aim to confirm and complement results.

7.1. The foresight recommending process

The action research developed in VERA, and analysis of the VERA empirical data, led us to confirm that the influence of the anticipatory phase on the recommending phase of foresight actually starts with the assimilation and reposition of participants’ mindsets in the hypothetical future scenarios. This constitutes the starting point or stepping stone for every foresight recommending process.

However, although repositioning participants in futures is a very important aspect of the recommending process, actor's representation is the pivotal factor that actually enables the advising activity. In fact, policy intelligence processes like foresight need participants to provide the human intelligence (creativity and rationality) capable of receiving future scenarios and generating with them practical advice.

In addition, the resolution factor makes the collective thinking process operative, thus contributing in a structured manner to elicit and synthesise ideas into a final advice discourse.

The sequential relations and implications between reposition, representation and resolution are described in Diagram 15.
We can see in the Diagram that actors’ representation embraces both the reposition and resolution factors. This is related to the previously mentioned pivotal function that actors (participants) actually represent in foresight processes.

On the one hand, participants play a critical role by assuming and repositioning their mindsets on future scenarios. On the other hand, they have the responsibility of generating those insights that eventually give sense to the advice resolution process.

The relevance of representation is also mentioned in the next section, where the three recommending factors (RRR) will be situated in relation to the whole foresight process. These factors help define some of the evolutions inherent in the fully-fledged foresight process.

The identification of the factors and evolutions within foresight processes gives us the opportunity to understand how anticipatory and recommending phase of foresight are in practice connected.

7.2. Connecting anticipation and recommendation phases of foresight

The utilisation of plausible futures as a way to find solutions to present problems involves an exercise of abstraction and imagination that demands the participation of many individuals. In this respect, we have already commented that an individual’s limitations in dealing with future scenarios justifies, among other reasons, the utilisation of collective thinking in foresight processes.

To explore the connections between future anticipation and recommended actions in these foresight processes, which is sometimes called the ‘black-box’ of foresight, it is necessary to assume that constructing visions (i.e. future anticipation phase) and utilising these visions to develop solutions to policy problems (i.e. recommending phase) are two very different mental processes.
Many VERA participants were involved in both the anticipating and the recommending phases. However, the intellectual effort required in each phase differs. While both phases make use of divergent thinking and human creativity, the recommending process has to rely more intensively on practical reasoning than the anticipating process.

These practical reasoning mechanisms are only activated once the project objectives (i.e. the agreed problem and targets) are assimilated by the participants and the future scenarios are introduced.

If we understand ‘evolution’ as a process whereby a situation is transformed (to a greater or lesser degree) into another different one, we conclude that the injection of future scenarios from the anticipatory to the recommending phase constitutes the first evolution within the foresight process.

Based on the evidence that VERA action research provided, we might say that the first evolution identified in the foresight recommending process is achieved by the injection of future scenarios. As we have already explained, the injection and assimilation of scenarios by participants involves repositioning their mindsets in these future scenarios. We can see this process as an evolution of scenarios (see Diagram 16) because, after repositioning, the initial future scenario can be hereafter considered a shared scenario,

a) where people (participants) have been repositioned,

b) whose characteristics are now acknowledged by a collective, and

c) that serves onwards as a baseline context for analysing the targeted problem.

Note that, as discussed in previous sections, the repositioning associated to this evolution stimulates fluency and originality of participant ideas in the advising process.

Diagram 16 Evolution of scenarios in foresight recommending processes

VERA showed that a second evolution is then necessary in collective thinking. This evolution is given by the injection of human intelligence into the advising process. Thus the process is able to generate participatory insights with the support of future scenarios. From this injection of intelligence, an evolution of actors (see Diagram 17) is achieved wherein:

a) new shared ideas and solutions - although still brainstormed or disaggregated - are likely to have emerged. Individuals’ ideas become shared insights.
b) the participants represented are supposed (through participatory discussions) to have reinforced their cognitive, memory and evaluation capacities (see section 2.3.3) with respect to the problem debated.

c) these participants - as a consequence of previous point b) - have absorbed knowledge, so are likely to be better able to embed shared messages into their institutions or organisations, as recognised in the conception of fully-fledged foresight (Miles, 2008).

Diagram 17 Evolution of actors in foresight recommending processes

A third evolution comes from injecting argumentation to the recommending process. From ‘Visions for Horizon 2020’ we confirmed that the intervention of the foresight team (or external team) is needed to transform the disaggregated information obtained through the participatory discussions into a shared and elaborated conclusion, which generally adopts the form of an advice discourse. This process could be seen as an evolution of ideas (see Diagram 18) because following the argumentation injection:

a) actor’s disaggregated ideas on future scenarios become present-relevant and framed recommendations. This is supported by a necessary sense making process.

b) disconnected ideas and actions are articulated around a consistent advice discourse, which eventually reveals existing relations between recommendations, synergies and potential incompatibilities.

Diagram 18 Evolution of ideas in foresight recommending processes

The identified foresight evolutions and their relation to the foresight phases (as described in the literature review) are described in Diagram 19.
This scheme represents, for the first time, a conceptual model that integrates Miles’ notion of fully-fledged foresight (Miles, 2008) with the foresight phases (Popper et al, 2011). The scheme presents a new conception of foresight in which both the fully-fledged foresight components (prospective, participation and practical dimensions) and these phases overlap.

The foresight recommending factors identified in this thesis, i.e. reposition, representation and resolution (see previous Diagram 15) are also embedded in the model, reinforcing the idea of overlapping. These factors give sense and continuity to the foresight path, especially in relation to the overlapping or connection, through scenarios repositioning, between anticipation and recommending phases.

In the following paragraphs we revisit the five phases of foresight from the perspective of foresight recommendations. It is based on Diagram 19, which presents a comprehensive model of the foresight process, highlighting the interrelatedness (double overlapping) between the fully-fledged foresight five dimensions and these phases.

- Scoping phase

One important task that needs to be undertaken in the *scoping phase*, in relation to the generation of advice, is to devise a procedure to deal with scenarios and generate advice. Independent of the future anticipation procedure to follow, it is important that the design considers the two previously identified repositioning aspects, i.e. the design may reflect on the level of transformation of the futures where the participants will be asked to be positioned, and the potential restriction (or autonomy) that participants have to explore their preferred perspectives from those futures. During the scoping phase some preliminary strategies may be drafted in relation to the resolution factor, especially regarding the level of argumentation eventually required.

Although the model (Diagram 19) represents a sequential process, the initial scoping phase and the transformation phase are theoretically connected or related. In fact, the relations between scoping and transformation suggest that both phases are the ones where the practical/policy dimension of fully-fledged foresight is more evident. Therefore, it is important to explore these relationships.

A first relationship is based on the assumption that it is actually desirable that the project rationales, discussed and defined in the scoping phase, will be eventually compatible with the achieved socioeconomic changes or transformations.

Another relationship is based on the recognition that transformation actually starts in the scoping activity. In fact, defining and designing the foresight process is already a moderately participative process in which different actors intervene, and whereby sponsors’ initial objectives, rationales or strategies for change could eventually be transformed. In addition, from the beginning of the scoping phase the presence of other involved actors, like the experts consulted, stakeholders, or the foresight team members themselves, usually gives rise to an operative foresight network whose interactive work may, in turn, have implications for their own institutions or organisations.
A third relationship between scoping and transformation can also be established when we observe that the scoping phase establishes the references that allow assessment of the effectiveness of the process and monitoring of the level of transformation achieved.

- Mobilising phase

The selection of participants needs to be carried out to support both the anticipating and the recommending phases. However, the mobilisation rationales and selection criteria are different in each phase.

With regards to the selection of participants for the recommending phase, we have to take into account (based on our research results) that the perspectives of the recommendations generated to tackle the problem will be influenced by the participants’ main domain of knowledge and by the role they actually assume within the system under study (see Table 35).

The mobilising and recommending phases are associated to the participatory dimension of fully-fledged foresight. In the model (Diagram 19), the overlapping parts of the mobilising phase indicate that foresight mobilised actors are usually involved in the scoping phase as well as in the construction of future scenarios.

- Anticipating phase

The anticipating phase is situated at the top of our fully-fledged foresight scheme, somehow indicating that future anticipation is the most distinctive aspect of foresight processes. The use of futures actually differences foresight from other advising or intelligence tools. However, very little is understood about the way anticipation actually contributes to produce practical advice. To some extent, this explains why foresight, despite its popularity, remains unfamiliar (and often ignored) to many scholars. Casting light on the influence that anticipated futures have in the recommendation phase of foresight is crucial to increasing the reliability of foresight in both the academic and the policy spheres.

Drawing on the design work developed in the scoping phase, the anticipation process constructs future scenarios. These scenarios usually represent different levels of transformation with respect to the present-day context. From the perspective of advising, this anticipation task basically prepares the material with which the participants of the recommending process will work. In this research we have found that repositioning these participants to highly transformed contexts eventually have consequences on the fluency and originality of elicited ideas. Our findings also showed that the desirability of exploratory scenarios, for the participants taking part in the recommending process, does not in principle affect the characteristics of the advice.

Repositioning means that one or several future scenarios need to be supplied from the anticipating phase to the recommending one. To some extent, as the objective is to situate individuals’ mindsets in hypothetical contexts to stimulate their creativity, the notion of repositioning could be potentially applicable to other future anticipation methods that also
facilitate images of the future. In this sense, repositioning people in highly transformed contexts becomes a broad and impactful concept that can help advisors to generate many original ideas, thus truly making a difference between foresight and other advising processes.

- **Recommending phase**

Once participants have assimilated a future scenario and repositioned onto it, i.e. actors are predisposed to adopt decisions or devise strategies as if they were actually living or immersed in this scenario, the anticipating and recommending phase are in practice connected. To some extent, waiving this repositioning phase would mean wasting the potential of scenarios to support the creation of advice. We conclude that the evolution of scenarios (future injection) described in Diagram 16 avoids that scenarios eventually become just hypothetical descriptions of the future with no practical utility in recommendation-oriented foresight projects, and in practice connects the anticipating and recommending phases.

As a consequence of repositioning, intrinsic elements of scenarios like topics, implicit messages, values, contextual problems, etc. are transmitted to the advisors’ minds. A conclusion of our research (see Table 37) is that future scenarios prepare and stimulate participants of the recommending phase to think more creatively about the targeted problem thus fostering the creation of numerous and original ideas.

However, repositioning on hypothetical scenarios to find relevant-for-today solutions demands, an exercise of abstraction that is better carried out through participation.

Participation, in particular actor representation in recommending panels, plays a pivotal role in foresight recommending processes insofar as participants receive scenarios (future injection), ‘reposition’ themselves on them, add human intelligence (intelligence injection), and produce insights in the resolution phase (see recommending box in Diagram 19).

The pivotal role of participation in the recommending phase explains the association of this phase to the participatory dimension of fully-fledged foresight. In fact, producing recommendations with foresight would make no sense without the presence of many individuals.

The practical/ policy dimension of the recommending phase is given by the transformative potential of the resolution factor (see in Diagram 19 how recommending and transforming phases overlap). We have already discussed that the practical dimension of fully-fledged foresight is already present in the scoping phase. However, in the recommending phase (more specifically, during the resolution process, i.e. elicitation and argumentation) this practical/ policy orientation is activated and intensified. Eliciting ideas and providing argumentation to the final advice discourse (advice resolution) are actually very practical activities highly oriented towards increasing the quality of the recommendations and eventually transforming policy action. The practical/ policy dimension of fully-fledged
foresight acquires however its strongest expression in the transformation phase, which is below described.

- Transforming phase

During the elicitation process participants absorb knowledge that can be transferred or reflected to their networks and institutions. This capacity of absorption and reflection reveals the transformation capacity of the foresight recommending process.

The argumentation activity also contributes to transformation. Transformation is facilitated by solid advice discourses, with strongly justified recommendations, and by the level of persuasiveness utilised to convince audiences of the benefits of advice implementation.

Elicitation and discourse argumentation (i.e. the resolution factor) thus explain the capacity of the recommending phase to foster transformation and change. Diagram 19 shows the overlapping of the recommending-transforming phases.

Once the foresight advice is finished and delivered, some dissemination and promotion of advice activities can be developed to achieve a more effective transformation.

The practical orientation of the transformation phase, i.e. the actual utility of implemented foresight recommendations and their fostered changes, needs to be regularly monitored in order to ensure their compatibility with the sponsors’ intentions and objectives agreed at the beginning of the foresight process.
Diagram 19 Double overlapping of foresight dimensions and phases

**Scoping**
- Design of the foresight process

**Mobilising**
- Actors’ selection & recruitment
- Potential participants and other stakeholders’ involvement in the design process

**Prospective**
- Scenarios construction & other future methodologies

**Transforming**
- Socioeconomic changes

**Anticipating**
- SCENARIOS CONSTRUCTION & OTHER FUTURE METHODOLOGIES
  - 1st evolution (scenarios) - Future injection
  - Reposition
    - Participants receive and are positioned in future scenarios
  - 2nd evolution (actors) - Intelligence injection
  - Re也是非常棒的！
  - Representation
    - Participants add intelligence to the process
  - 3rd evolution (ideas) - Argumentation injection
  - Resolution
    - Participants and advisors are involved in the elicitation and argumentation of practical advice
  - Reposition
    - Participants receive and are positioned in future scenarios

**Recommending**
- Actors’ participation & interaction
- Actors’ involvement in futures anticipation

**Participate**
- MOBILISING
- Actors’ involvement in futures anticipation

**Prospective**
- Policy/practical orientation

- Representation
  - Participants add intelligence to the process

- Resolution
  - Participants and advisors are involved in the elicitation and argumentation of practical advice

- Reposition
  - Participants receive and are positioned in future scenarios

- Reposition
  - Participants receive and are positioned in future scenarios
7.3. Advice typologies

The previous sections presented research results on factors that can affect the recommending processes and the foresight advice characteristics. It is, furthermore, interesting to note other complementary findings, which have emerged as a result of the comprehensive analysis developed in the two case studies. These findings are three practical observations that may improve and enrich the foresight recommending practice. They are based on the capacity of the foresight eliciting processes to induce certain types of recommendations.

A first observation is based on the possibility of introducing some activities in the elicitation process that could increase rational strength of final advice. A typology of recommendations is proposed below that can be used by foresight facilitators to guarantee that the recommendations generated in the group discussions have the right level of soundness.

A second observation relates to the capacity of the elicitation process to facilitate or induce the generation of certain types of insights from participants. This refers to the possibility of orientating the recommendations towards some specific aspects related to the character of the advice implementation.

The third observation, which is only illustrated for R&I policies advice (although the concept is applicable to other policy fields), consists of modelling the elicitation process so that it will facilitate the generation of insights of a different nature depending on the policy target. In particular, a typology of recommendations based on an adaptation of Edler and Georghiou’s (2007) taxonomy of innovation policy tools is suggested.

In the next three sections these three observations are described and analysed.

7.3.1. A typology of recommendations based on the level of soundness

The importance of soundness in the construction of foresight recommendations was outlined in the argumentation and practical reasoning discussion in 3.7, and later illustrated through the advice discourse analysis (‘explanation’ layer of ADA) of ‘Vision for Horizon 2020’. In that analysis, the level of soundness was evaluated with the support of experts’ questionnaires. Later, the observation of the VERA recommending process, through action research, suggested the possibility that specific elicitation tasks were designed to help foresight processes to increase the level of soundness of the recommendations. Bundling, which also constitutes a new approach in foresight practice, was also presented in VERA as a smart manner of reinforcing the level of soundness of otherwise single recommendations.

Given the relevance of soundness, the Table of annex 10.5.1 proposes a typology of recommendations to orientate soundness-related activities during foresight elicitation processes. The typology can also be utilised to guide and support a potential ex-ante or ex-post evaluations of the foresight advice. In this respect, annexes 10.3.4 and 10.4.6 illustrate how some samples of recommendations, extracted from ‘Visions for Horizon 2020’ and from
the three VERA bundles, respectively, have been evaluated in terms of soundness using this typology.

The Table in annex 10.5.1 assumes that soundness is a very significant aspect of advice quality. Accordingly, the upper part of the Table represents a high quality type of advice in contrast to the bottom row of the Table, which represents a very deficient advice. Looking through the Table we can identify different levels of soundness or quality.

It is important to note that some recommendations, although not having a full level of soundness, may be acceptable by the policy maker. As a matter of fact, policy recommendations hardly ever present the optimal and highest levels of soundness. It is important, in this respect, that the advice discourse recognises these weaknesses and provides some suggestions to deal with them. For example, in relation to the existence of dilemmas and controversies, some complementary options could be proposed if the recommended action would definitely bring about negative collateral effects for the advisee in other areas. In general, the acknowledgment of weaknesses can make the policy advice discourse more persuasive and reliable.

A comment needs to be made, finally, on the risk that vague advice could be misleadingly considered sound. Unfortunately, in many occasions foresight gives rise to highly generic recommendations that, from a logical point of view, could not be in principle rejected (e.g. recommending that for strengthening the European Research Area the ‘improvement of the attractiveness of research careers’ is needed). This sort of recommendation is actually so broad and obvious that, despite their banality, it looks absolutely necessary, in contrast to other more concrete and precise recommendations. From another perspective, we may realise that very generic recommendations are, in general, unfeasible. They are so wide and ambitious that their implementation is frequently much more difficult than the implementation of concrete and precise actions.

7.3.2. A typology of recommendations based on the character of implementation

One of the most important tasks carried out during the selection of case studies in this thesis was the reviewing of lists of multiple recommendations. This comprehensive reviewing process allows us to understand what characteristics policy recommendations present, in general, in the final advice reports.

An important aspect, for example, identified through the combination of this reviewing process, VERA action research, and the V2020 discourse analysis, was the relevance of soundness, as described above. Other advice characteristics or features were not so evidently manifested as was soundness, or appeared less recurrently throughout the research. One of these aspects is related to the implementation character of the recommendations. Despite being probably less critical and evident than soundness, this aspect is interesting as a basis for a new recommendation typology.

The implementation character of a recommendation is related to the precedent trajectory of actions, i.e. to the recurrence of past policy initiatives. It requires participants to reflect on
those past actions that are likely to be recovered. This approach means that, at the time of advising, participants need to master the area of discussion and be fully aware of the policy history and the context. In the Table of annex 10.5.2 this typology is described.

Recommendations can be totally new for the policy makers. As referred to in the Table, this type of recommendation includes emerging recommendations or actions that, while being new for the policy makers, are recovered from past experiences in other fields.

If the better option is not to introduce new initiatives, we have a conservative type of advice. This type of recommendation may, however, suggest some intensification or de-intensification of the implemented initiatives, i.e. reinforcing or decreasing the current policy action. A conservative option would consist of the maintenance of policy actions just as they are, i.e. with no changes at all. Note that this is an absolutely valid option, as recommending ‘doing nothing’ is still a recommendation. Indeed, conservative actions may sometimes be the riskiest options to solve problems.

When the recommended action consists of the finalisation of existing policy initiatives we are actually referring to a concluding type of recommendation. In these cases, the termination of the action can be transitory or definitive. If the paralysation is transitory, the recommendation should also inform the duration of the transition period, and include some insights on those initiatives that can be undertaken during that latent period to prepare the potential resumption of an action.

Finally, advisors can opt for recommending a combination of policy actions. This combination may either include only existing actions (e.g. establishing new relationships and linkages between existing research programmes and other industrial policies), or introduce new external initiatives (actions that have not been implemented by the policy maker to date). In both cases, it is very important to guarantee adequate synergies, as the impact achieved with the conjunction of different recommendations could eventually be more positive than the impact obtained separately. The combination of recommendations referred to here is based on the bundling concept already explained in the context of VERA.

Using this typology may shed light on the extent to which society (or any other R&I actor) accepts or rejects ongoing policy initiatives. For example, in highly participatory advising processes (e.g. citizens’ open consultations) a large proportion of recommended new actions together with a high proportion of concluding ones suggest that the public is not satisfied with the efficacy and usefulness of ongoing policies.

An application of this typology to the recommendations generated in ‘Visions for Horizon 2020’ is included in annex 10.3.5.

7.3.3. A typology of recommendations based on their policy target

This typology refers to a large extent to the alignment between the foresight sponsor’s targets and the nature of the delivered advice. In general, foresight projects are designed
according to a set of very specific policy maker’s objectives or targets that can be addressed with different alternative solutions.

With regards to innovation policies, some of these solutions are summarised in the Edler and Georghiou (2007) policy tools taxonomy. They distinguish between demand-side and supply-side solutions (see Table included in annex 10.5.3).

In the Table we can see that, apart from providing insights for demand and supply orientated policies, foresight advice is also useful for improving the policy internal mechanisms and for supporting science and technology agenda setting. On the one hand, ‘measures for improving policy mechanisms’ is related to the possibility of using foresight to produce advice oriented to strengthen policy agenda definition, formulation, implementation, and policy evaluation activities. This advice would basically consist of recommendations that would make the traditional phases of policy making more effective. On the other hand, ‘utilising foresight for STI agenda setting’ means to generate recommendations for STI prioritisation. Prioritisation-related recommended actions may either be oriented to business, i.e. proposing areas to invest in, or focused on the areas where it is recommended to initiate or increase research.

Although the typology has been conceived for the innovation field, it can also be applied to other policy fields. The basic idea is to provide foresight participants, in advance, with a scheme of those policy areas where discussions should preferably be focused.

To put in practice this approach it is very important that the foresight team have previously analysed and discussed with the sponsor (i.e. in the scoping phase) in what sort of policy areas they are seeking a higher number of recommendations, or more elaborated ones. By understanding these areas of advice or sponsor’s expectations the foresight process could eventually achieve a better alignment between the foresight advice and the initial objectives.

Similarly to the previously mentioned typologies, this typology could be used not only for advice elicitation purposes but also for advice evaluation. An example of advice evaluation, utilising this typology perspective, can be found in annex 10.3.6 in relation to the ‘Visions for Horizon 2020’ discourse.

In summary, these three typologies have allowed us to look at policy recommendations from three different angles: the reference to soundness, the perspective of implementation, and the attention to the policy targets. However, they are not exclusively useful for policy advice. In fact, these typologies could be used to orientate recommendations of any sort.

There are very few initiatives in the literature that tried to understand the nature of policy recommendations. Even less evidence exists on initiatives that tried to provide some kind of advice characterisation. In this respect, the three typologies presented here add value and constitute a step forward in the practice of policy advice and evaluation.
7.4. Experts’ concluding reflections

The objective of this section is to briefly present some experts’ assumptions about the practice of foresight, in general, and to discuss their opinion on our research findings. In line with the questions addressed in this thesis, and taking into account the nature and the sponsors of the case studies analysed, a set of eleven semi-structured interviews were designed to capture, without being highly exhaustive, insights from four different types of actor: foresight coordinators, European Commission foresight officers, R&I policy advisors, and R&I policy makers.

The two coordinators of ‘Visions for Horizon 2020’ and VERA were interviewed to understand more profoundly the rationales behind each project, and to get their impressions about the actual utility of foresight during each process. The three EC officers’ interviews were conceived to learn what sort of policy advice the European Commission, as institution, was in principle aiming to receive, trying to understand policy makers’ requirements from an alternative perspective. Another very relevant consulted actor was the policy advisor. Four advisors’ opinions tried to fill the gaps that, at the final stage of this research, could still exist on the generation of advice. These meetings also served to confirm that the final conclusions were actually well oriented to existing advising best practices. Finally, two interviews with policy makers aimed to confirm whether the suggestions presented in this thesis on the advice desirable characteristics could meet decision makers’ actual expectations.

The annex 10.6 describes the themes discussed in the interviews. It shows how the concept of fully-fledged foresight and our two research specific questions were addressed on the interviews. For reasons of clarity, the experts’ insights are structured into three sections. While section 7.4.1 presents their opinions on the utilisation of fully-fledged foresight as an instrument of policy intelligence, sections 7.4.2 and 7.4.3 refer more directly to our research questions.

7.4.1. General reflections on fully-fledged foresight

The reflections provided by the experts are principally oriented to the policy and participatory dimensions of fully-fledged foresight.

A first message obtained from the interviewees is the necessity of understanding foresight as an instrument of political and policy inspiration. Foresight has a political component, as in practice foresight cannot be detached from the policy environment and political momentum. In this respect, foresight may be even used as an excuse for policy action. The policy dimension entails acknowledging the coexistence of different constellations of actors, with their different political paths, inertias, political perceptions and ideologies. This orientation demands a conception of foresight that recognises the use of futures for intelligence to involve a dynamic and sustained process, more oriented to the gradual creation of knowledge sharing and covering spaces between these system actors than to formal results.
A second message relates to the necessity of relying upon expert panels that reflect the dynamics of the analysed system. In this respect, the use of foresight is found superior to cost-benefit studies or public consultations procedures, which often look somewhat limited and ‘naïve’. There was, in addition, near-unanimity across interviewed experts that the reliability of foresight is to a very large extent based on the legitimacy and credibility of the participants, as Harvey & Fischer (1997), Goldsmith & Fitch (1997), Sniezek et al. (2004), and Haas (2004) already suggested in the literature. A smart representation of actors in discussion panels can also reinforce the capacity of persuasion of the final advice (Petty et al, 1997).

A third idea concerns the importance of advice being acknowledged and endorsed by relevant stakeholders to be better accepted by policy makers. There was a high consensus that, as a complement of this endorsement, policy advice also needs to be positioned and disseminated through the right decision paths and try to address key actors within the system.

A fourth message that clearly emerged from the interviews referred to the policy makers’ reluctance to accept and implement advice that implies large or radical changes. In this regard, some experts would even find useful and reasonable that policy intelligence tools, like foresight, built their results upon the recommendations generated by past exercises. In the practice, this implies that foresight would eventually facilitate incremental evolutions of the system rather than suggesting disruptive transformations. One possible reason for policy makers preferring this sort of ‘moderate’ advice could be the difficulty that advisors normally have in understanding complex systems and their potential transformations, especially in environments with high uncertainty, which makes advice receptors less confident. In fact, advisors need to dedicate many resources to understand the problem and, quite frequently, have to frame or reshape the policy questions.

7.4.2. Influencing factors in foresight recommending processes

Our interviewees have also discussed the three factors of the recommending processes, namely future repositioning, actor’s representation and advice resolution.

- As for the future repositioning factor, we can observe the interviewees’ agreement on the capacity of scenarios to stimulate the generation of ideas. The effect of highly transformed scenarios on the fluency and originality of insights was found to be reasonable and was very easily endorsed. They found creativity an inherent element of foresight projects, not least because foresight frequently addresses systemic issues, which require open thinking, holistic approaches, and novel perspectives.

- With regard to the representation factor, one agreed message consisted in the necessity of involving policy makers in foresight projects. Their active participation in the scoping phase and their engagement throughout the process (e.g. participation in some workshops or validation of interim drafts) were unanimously recommended. Their contribution is
particularly important at the end of the project, as an effective way of sharing and validating results. In general, this sort of engagement creates a sense of co-design and co-creation in participants (not only policy makers).

A second message concerning the representation factor refers to the need of maintaining a good balance between a broad and a selective participation. Representing system actors in foresight panels is found a critical task, as on many occasions it is very difficult to identify in advance the potential action of lobbies or influencing parties (‘opinion formers’) that could try to embed interested agendas. Despite the importance of achieving a balanced and efficient representation in participatory advising processes, the experts in general accepted the actual impossibility of excluding the participants’ values and personal preferences from advisory panels. In this sense, a broad participation is useful, as individuals’ interests would be eventually integrated and dispersed within those of the collective.

- As for the advice resolution factor, the experts emphasised the necessity that foresight discourses take into account the type of audience that the recommendations are actually targeting. In this respect, it is interesting to analyse and understand the policy context and the established political direction. (Some comments referred, for example, to the difficulties that may arise to convince the EC on the benefits of evolving from the established five ERA dimensions to the nine dimensions suggested by VERA.)

To be politically accepted, the discourse also needs to make an adequate use of argumentation. Argumentation was actually considered by most interviewees a critical aspect of the discourse elaboration, thus endorsing one of the key messages of this thesis. Policy advice needs to be argued with the support of reliable, relevant and coherently articulated evidences. It is also important that foresight discourses guarantee the feasibility of suggested actions and includes precise insights on the way they could be eventually implemented. This means avoiding the presentation of very generic or vague recommendations. In this sense, a brief and straightforward summary of main messages was found useful to complement the main reports.

The experts also provided positive opinions on the possibility of making bundles of recommendations. They found bundling a practical solution, for example, to provide policy makers with packages of actions that could potentially address different scenarios alternatives.

### 7.4.3. Connection of future anticipation with recommending processes

In this final section, we will present experts’ opinions on the usefulness of scenarios to support the generation of policy recommendations.

In general, the interviewees found foresight scenarios capable of capturing the dynamics of the R&I system and stimulating the generation of ideas. However, it is important to note that most of the experts consider future scenarios mere instruments of intelligence. The practical utilisation of scenarios to conceive solutions to present problems requires that:
a) foresight recognises the uncertainty inherent to systemic problems, i.e. admitting that the proposed scenarios only reflect a hypothetical context and most probably have overlooked other relevant future situations,

b) foresight presents scenarios as a warranty of neutrality, emphasising their utility to avoid political biases, and

c) scenarios actually take distance from current policies, thus presenting impartial indications on political efforts and reforms that are needed in every future context.

The practical dimension of foresight scenarios is materialised by the generation of policy recommendations. The experts believed that scenarios are indispensable tools to connect future-thinking with problem-solving oriented processes. However, in general they do not think that, for this purpose, scenarios have to be furnished with many contextual details and technicalities. Rather than loading scenarios with complexity, scenarios would better connect with this practical dimension if they were able to reflect plausible evolutions of the studied system, thus showing their flexibility and dynamic potential.

This final interviewing process aimed to obtain a ‘big picture’ of the practice of fully-fledged foresight, from the point of view of some selected R&I actors. It served to challenge and validate some research findings, especially those related to foresight influencing factors and the usefulness of scenarios.

An overall interpretation of the discussions concludes that foresight is considered by experts a very attractive and practical instrument of intelligence. This attractiveness is explained by the capacity of future scenarios to foster creative thinking, and by the potential of stakeholders’ participation to increase the levels and quality of European governance. However, foresight methodology, in theoretical terms, is probably not well understood.

It is in general assumed that foresight may be eventually used as a political tool, hence the interviewees’ suggestions to undertake further work, this thesis being an example of such work, to understand more in depth future oriented processes and to devise new methodological procedures that ensure the quality and neutrality of their results.
8. CONCLUSIONS

There is a very limited understanding of the process that foresight utilises to generate recommendations from future scenarios. It is surprising that, despite the importance that the generation of policy advice has for policy action, so little attention has been paid to this aspect in the foresight literature. This knowledge gap has motivated this thesis.

In particular, the research tried to answer the following questions:

1. What are the main factors that influence the generation of advice with foresight?
2. How can the connection between the anticipating and recommending phases of foresight be explained?

The theoretical baseline over which this research stands is the broadly recognised concept of fully-fledged foresight (Miles, 2008). Accordingly, the literature review and the action research analysis were structured around the prospective, participatory and practical/policy dimensions and involved looking at the foresight recommending process through those three different lenses.

The methodology helped to explore both foresight recommending outcomes and process. For the outcomes, the research developed a critical analysis of the advice discourse from an already completed case study (case study 1, V2020, in chapter 4). This case provided valuable insights, especially with regard to the final advice elaboration or resolution. In particular, it served to extract lessons on the relevance of panel’s representation (which strongly induced the detailed analysis of actors’ representation made in VERA), the influence of argumentation (which helped to understand the fleshing out process developed in VERA), and the benefits of assessing the level of soundness of the recommendations (VERA bundles were also assessed in this respect).

While these are very important lessons on the advice construction, the case only permitted a limited exploration of the full foresight process. It was then reasonable to utilise another, complementary, case study. To understand the foresight process comprehensive action research involving an ongoing foresight project (case study 2, VERA, in chapter 5) was therefore developed. Chapters 6 and 7 analysed and interpreted, respectively, the findings.

Now, this final chapter summarises the principal research conclusions, provides reflections on their implications, acknowledges limitations, and suggests areas for further research.

8.1. Main concluding messages

Below three overall conclusions are presented. Each of them is composed of a main statement, a brief explanation and some related specifications.

Conclusion 1:

Reposition, representation and resolution are influencing factors in foresight recommending processes
Looking at the foresight recommending process with a prospective, participatory and practical focus has served to reveal the existence of, respectively, three influencing factors: reposition, representation and resolution. These factors can be used to modulate the characteristics of the final advice (see Table 38).

- **Future reposition**
  This refers to the process whereby foresight participants situate their mindset in hypothetical future contexts, thus being predisposed to adopt decisions or devise strategies as if they were actually living or immersed in this scenario. Repositioning participants in highly transformed scenarios stimulate their creativity, in particular it facilitates the generation of more numerous and original ideas.

- **Actors’ representation**
  This factor relates to the composition of advisory panels in foresight processes. The presence of different actors’ roles and areas of knowledge within these panels has an important influence on the variety and flexibility of themes/perspectives considered by the participants to find solutions in problem-solving situations.

- **Advice resolution**
  This is associated to the intervention needed to elaborate the advice discourse from the initial participants’ insights. Elicitation and argumentation are specific advice resolution tasks that, respectively, have influence on the type of recommendations generated and the level of elaboration/precision of the advice.

**Conclusion 2:**

**The foresight recommending process presents three types of evolutions: scenarios, actors and ideas.**

Assuming that evolution is as a process whereby a situation or object is transformed or significantly changed, we can identify three evolutions within foresight recommending processes (see Diagrams 16, 17 and 18):

- **Evolution of foresight scenarios**
  Once the recommending phase receives the scenarios created in the anticipatory phase and repositions their participants into them (i.e. injection of future into the recommending process), these ‘not-yet-used’ scenarios are transformed into useful scenarios whose features are acknowledged and shared by participants, thus constituting the baseline for the participants’ problem-solving debates.

- **Evolution of foresight actors**
  Through participation (i.e. injection of intelligence into the recommending process) individual actors are transformed into foresight participants that share collective insights, thus reinforcing their intellect capacities with respect to the problem addressed, and becoming potential transmitters of knowledge into their institutions or organisations.

- **Evolution of foresight ideas**
By means of argumentation, a collection of disaggregated ideas (related to the future scenarios where participants were repositioned) is eventually transformed into a consistent discourse that provides today-relevant solutions (i.e. injection of argumentation into the recommending process).

**Conclusion 3:**

**Every connection between the foresight phases is explained by the overlapping of two fully-fledged foresight dimensions.**

An overlapping of two fully-fledged dimensions (prospective, participatory and practical/policy) can be identified in the linkages (see Diagram 19) between the foresight phases (scoping, mobilising, anticipating, recommending and transforming).

- **The overlapping of prospective and participatory dimensions explains the connection between the mobilising and anticipating phases of foresight, as well as the connection between the anticipating and recommending phases.**
  a) A prospective and a participatory orientation are frequently adopted to create future scenarios. Future anticipation is facilitated by interaction and participation, which explains the presence and influence of both dimensions in the connection between the mobilising and anticipating phases.
  b) A prospective and participatory overlapping is also necessary to initiate the recommending process. The recommending process is actually activated in the anticipating phase (prospective dimension). The participants (participatory dimension) then receive 'not-yet-used' future scenarios from this phase and, only once they have assimilated these scenarios and repositioned upon them, can the recommending phase continue. From this perspective, we conclude that repositioning gives sense to the connection between both phases.

- **The overlapping of participatory and practical/policy dimensions explains the connection between the scoping and mobilising phases of foresight, as well as the connection between the recommending and transforming phases.**
  a) A participatory and a practical/policy orientation are needed to delimitate and design the foresight process. Defining the foresight process is a modestly participative process whereby sponsors’ initial objectives and strategies for change could eventually be transformed. This explains the connection and relationship between the scoping activities and the mobilising phases of foresight.
  b) A participatory and a practical/policy orientation are also required to generate foresight final advice discourses. The final resolution of foresight advice, which is fundamentally based on elicitation and argumentation, is a participatory process, highly oriented towards transforming policy action. This resolution process can be seen, therefore, as the connection between the recommending and transforming phases.
8.2. Implications of the research results

This section presents methodological, theoretical and practical implications of the research.

- Methodologically, the experience has served to demonstrate the potential of action research, which proved to have enough capacity to promote the generation of knowledge and to put this knowledge into action, thus confirming its ‘practical, participatory and emancipatory’ character (Reason & Bradbury, 2001). While admitting the inherent difficulties of the method in maintaining distance from the object of study, the possibility of applying action research in VERA, and having full access to the primary material generated in seven foresight workshops, facilitated valuable (and exceptional) conditions to make a full tracking of recommendations generation.

The combination of action research and critical discourse analysis is a consistent research strategy that can be replicated by researchers and analysts to understand the generation of advice with other policy intelligence instruments. The combination of Fischer’s notion of practical argumentation with Fairclough’s three layers of analysis constituted a useful frame to explore the generation of policy advice discourses (V2020) with a critical perspective.

- From a theoretical point of view, the conclusions presented in the previous section represent a three-level explanation of foresight advice generation. While the recommending factors identified in the first conclusion can be seen as a first or operational level of explanation, the foresight evolutions described in our second conclusion go one step further, to some degree representing a second and higher descriptive level. Finally, the integration of foresight dimensions and phases, described in the third conclusion, represents a third level of conceptualisation. These theoretical developments are introduced for the first time in the foresight literature.

In particular, the influence of repositioning people in future scenarios to foster fluency and creativity gives a theoretical response to some foresight scholars demanding some light on the factors that can actually promote creative knowledge in foresight workshops, beyond the influence of facilitators or the participants’ imagination (Dufva & Ahlqvist, 2015). Even more relevant for foresight theory is the double overlapping model that conceptually connects the well-known foresight dimensions (Miles, 2008) with the foresight phases as conceived by Popper (2011).

Introducing sound criteria in advice evaluation reinforces Fischer’s claims for using logical inferences in practical argumentation (Fischer, 2007) and theoretically connects with Shad’s conception of ‘good reasoning’ (Shad, 2000). From a more pragmatic perspective, an ex-ante evaluation of the collateral consequences of recommendations is aligned with Fairclough and Fairclough’s (2012) idea of irrefutability.

- Apart from the abovementioned methodological and theoretical implications, this research also has very practical relevance. Foresight practitioners, to begin with, can now stimulate the originality of ideas through the design and utilisation of highly transformed scenarios. They can also increase the attention to particular perspectives in the final discourse through
an adequate design and composition of foresight panels, as learnt from V2020. By taking into account the guidelines (Table 8) proposed in this thesis for practical argumentation, they would be also able to offer more consistent and convincing advice discourses to decision makers.

Some foresight innovations, conceived and explained in this thesis (and implemented in VERA), like the framing of insights with a polygonal approach or the elaboration of advice bundles, can find, in addition, very practical application in most of foresight projects.

Finally, and continuing on practical terms, our advice discourse analysis (ADA) could support the ex-ante evaluation of policy advice, thus assessing the potential usefulness and effectiveness of recommended actions (generated with foresight or with any other advice instrument) prior to their eventual implementation. In particular, applying sound assessment at the policy formulation level could be useful to preserve the integrity and consistency of policy actions, especially in those emerging policy initiatives that would potentially suppose a high impact in society, and to minimise the impact of wrong policy decisions.

8.3. Limitations of the results

The analysis of the two case studies - supported by a comprehensive literature review and complemented with the insights obtained with the final interviews – has facilitated a profound understanding of the generation of policy advice with foresight. However, we have also to acknowledge some limitations of our research process. Below these limitations and difficulties are classified into four categories, responding to their methodological, empirical, conceptual, or causality nature.

- Methodological limitations

Case study research is usually criticised concerning the difficulties of generalising its results. In this respect, we have to acknowledge that our findings may not be fully applicable to all foresight projects. However, we have also to recognise the high capacity of generalisation of the VERA results. From an overall perspective, the VERA project is a faithful representation of many traditional scenario-based processes. It is usual to find different grades of transformation in foresight scenarios, which allows, for example, the generalised utilisation of the ‘reposition’ effect in foresight design. Most importantly, the capacity of generalisation of VERA results was significantly favoured by the magnitude of the project, which allowed the design and replication of seven participatory processes and workshops, each of them being per se a different a case or object to analyse (about 40 discussions on scenarios replicated the same elicitation procedure). Each of those seven processes engaged different types of R&I actors, thus findings related to the effect of the ‘representation’ factor should be also broadly applicable.

Action research also brings about some methodological concerns. They principally refer to the distance needed between the action researcher and the observed process. Action research is subject to criticisms due to the risk that researchers eventually affect the results. While acknowledging the difficulties that this risk brought to the thesis, we have to also state...
that, from the VERA project perspective (in particular its recommending phase, which was the object of this thesis), this action research has helped to develop a meticulous and highly structured analysis of elicited data, being negligible the influence of personal interpretations of these data. In addition, to foster transparency, the VERA team produced interim policy briefs with preliminary conclusions that were delivered to the foresight participants. This not only facilitated the examination and endorsement of the results, but also guaranteed the integrity of the research process and dissipated concerns on possible interferences.

Discourse analysis sometimes brings about criticisms related to the analyst's subjectivity. Interpreting and synthesising actors' ideas was a difficult endeavour in this research, especially when the analysis tried to assess the quality of the argumentation supporting these ideas and identify fallacies. To minimise these difficulties, the thesis has proposed a structured 'three layers' model (ADA) that can be replicated in the evaluation of policy advice discourses.

Finally, some methodological limitations refer to the final interviewing process. The high experience of the interviewees compensated for the limited number of interviews undertaken. A reduced and selective interviewing process was found sufficient to endorse findings, challenge results, and capture the essence of foresight from different actors' perspectives.

- Empirical limitations

The research methodology was designed to learn from foresight outcomes (advice discourses) and about the foresight process (in particular, the recommending phase of foresight). The research work made in the first case – focus on the outcomes - effectively supported the analysis of the second case – focus on the process- by providing valuable preliminary lessons on panel representation, argumentation and soundness. But it is necessary to admit that probably this support would have been more effective if there had not been so big differences of scale between the two cases. The dimension and visibility of both cases were actually very different. However, the similarity of the European R&I problems addressed in both cases, which actually spoke the same language, and their overlapping in terms of time, helped to much better understand what one case was 'telling' to the other, thus ideas and provisional findings were conveyed fluently across both analysis.

As for the first case, we can also question whether the argumentation analysis of the panel ‘Inclusive, innovative and secure societies’, and the lessons extracted from that analysis, would have differed, and to what extent, from the analysis of other panels (e.g. transport, health or energy domains) which are immersed in other very different contexts. In this respect, we can affirm that our findings remain valid as, regardless of the panel examined, ADA requires to systematically analyse the impact that over the advice has any socioeconomic, ethical, political circumstances.

The second case largely limits the application of the findings to scenario-based foresight projects. In fact, the ‘reposition’ factor (included in the first conclusion of this thesis) is
exclusively understood and applicable in relation to scenario methodologies. The
conclusions on the ‘representation’ factor, while being less restrictive, also assume the
utilisation of future scenarios as a basis for debate. The ‘resolution’ factor, in particular with
relation to the influence of argumentation, is the only factor applicable beyond scenarios
methodologies.

The evolution of scenarios (second conclusion of the thesis) is obviously limited to scenario-
based methodologies. However, the evolution of actors and ideas can be easily extrapolated
to other foresight anticipation methods.

The overlapping between foresight dimensions and foresight phases (third conclusion of the
thesis) is also exclusively applicable to scenario approaches.

Finally, we cannot find empirical or generalisation related limitations with respect to the case
studies domain. Foresight (as shown in the annex 10.1) and discourse analysis are actually
applicable across multiple sectors, and normally support very varied disciplines. As the
thesis has not utilised domain-specific criteria or assumptions in the analysis and elaboration
of the conclusions, we should not assume that the extrapolation of findings beyond STI is
unsound.

- Conceptual limitations

The assimilation of the conclusions of this thesis demands from the reader some experience
in the participation in foresight processes together with a moderate-to-high understanding of
foresight theory. Consideration of the overlapping of dimensions and phases, for example,
needs to acknowledge that other conceptions of phases can be found in the literature.
However, the evolution of scenarios, actors and ideas probably represents a concept that is
more easily and intuitively understood by those uninitiated in the discipline.

Despite the qualitative nature of this research, some of the main findings are rooted to
simple but rigorous quantitative approaches. This sort of analysis implied the utilisation of
variables that in some cases were difficult to be described or operationalised. Measuring the
originality of the participants’ insights across seven workshops in the second case study
without external assessment was, in this respect, a complicated task.

Other conceptual difficulties emerged when adapting and shaping the conventional
discourse analysis approach into a model (ADA) that could eventually evaluate foresight
outcomes. Not only was the future dimension added to the traditional analysis, but also such
analysis should be able to assess the advice discussion, which is a very specific and rhetoric
type of discourse by itself. The utilisation of this model will hopefully assist analysts to better
assess policy advice and foresight practitioners to elaborate more consistent advice
discourses.

- Causality limitations

Identifying and explaining the effect that the foresight factors (reposition, representation,
resolution) have on the recommendation characteristics required the identification of cause-
effect relationships. The observation of these effects and relationships along seven workshops in the action research case seems sufficient to extract causal conclusions.

Some of these causalities, like the possibility of stimulating fluency and originality of participants’ ideas by ‘repositioning’ them in highly creative and transformed contexts, can be easily assumed as they do not contradict common sense and seems highly coherent.

Interestingly, the stimulation capacity of ‘desired’ scenarios to produce higher number of ideas, which would have been in principle a quite intuitive and expected effect, was not empirically supported; this could give rise to further exercises for corroborating expectations or further investigating their refutation.

More difficulties were found in the first study to identify and explain causal relationships with discourse analysis. As the method is by nature interpretative, the conclusions may be more easily called into question in spite of supporting evidence. In this regard, the first layer of ADA, which essentially tries to extract recommendations from the discourse and align them with the sponsor’s objectives, enables us to more easily detect relations and infer less disputable conclusions.

8.4. Further research

Given the limited work that policy advice (in particular foresight advice) represents nowadays in the literature, it seems very worthwhile to propose new research topics in the area. In fact, our research journey has inspired the identification of some knowledge gaps and several issues for further exploration.

Firstly, and as a natural and logical continuation of our research questions, it would be useful to study the connection between the recommendation and transformation phases of foresight, i.e. assess the alignment between sponsor’s expectations, foresight advice (and other foresight outcomes) and the impacts actually achieved.

Secondly, a more profound exploration of the novel concepts of polygonal framing and bundles conceived and explained in this thesis is needed. An interesting research work could consist of assessing the actual capacity of these approaches to provide consistent and sound advice as well as improving their effectiveness.

Thirdly, those interested in advice argumentation could apply the ‘three layers’ model for advice discourse analysis to other advice practices different to those generated through foresight. In particular, the guidelines proposed for evaluating argumentation could be tested or challenged through the application to advice discourses that address sensitive areas of research, like emerging technology impact assessments (e.g. evaluating collateral consequences of their development), advice discourses on demographic and migration issues, or responsible research and innovation policies, for instance.

Fourthly, an interesting research line could consist in comparing the utilisation of traditional foresight facilitation (elicitation) processes with facilitation methods that include soundness
assessment activities. In general, considering that the testing of soundness is applicable to any advising process, this sort of comparison offers a broad range of research opportunities.

Fifthly, some research could address the temporal dimension of advice. Some influencing aspects might incline advisors to suggest easily and immediately implementable initiatives to decision makers, while other factors may exist that, on the contrary, predispose advisors to recommend the implementation of recommendations only in the medium or long term (e.g. planned actions that take the form of roadmaps).

Finally, we have to mention the possibilities that the advice typologies presented in this thesis have in terms of policy research. They can actually open the door to many research questions, based on benchmarking and comparison. The typology concerning soundness can be used, for example, to evaluate (ex-ante or ex-post) the actual efficacy of policies across areas and countries, thus identifying gaps, similarities and trends. The typology based on the character of implementation could be useful to explore whether policy advisors in different regions, countries or sectors tend to recommend new policy initiatives, maintain existing ones, conclude policy processes, or combine ongoing policy programmes. The typology concerning policy targets could be used to analyse and debate, for example, why and to what extent advisors in specific policy areas generally propose supply-side policies rather demand-side ones. The exploration of new advice typologies, and the generation of new ones, may constitute per se an appealing area for further investigation.
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## 10. ANNEXES

### 10.1. PRE-SELECTION OF CASES

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<th>N.</th>
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<th>SCOPE</th>
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<td>Information &amp; Communication technology</td>
<td>2004</td>
<td>Scenarios workshop</td>
<td>Research Council of Norway</td>
</tr>
<tr>
<td>47</td>
<td>The Future of ICT and Learning in the Knowledge Society</td>
<td>Europe</td>
<td>Enabling technology</td>
<td>Information &amp; Communication technology</td>
<td>2005</td>
<td>Experts panels</td>
<td>European Commission</td>
</tr>
<tr>
<td>48</td>
<td>Nordic ICT Foresight: Futures of the ICT environment and applications on the Nordic level</td>
<td>Nordic countries</td>
<td>Enabling technology</td>
<td>Information &amp; Communication technology</td>
<td>2007</td>
<td>Scenarios workshop</td>
<td>VTT, FOI, SINTEF &amp; DTI</td>
</tr>
<tr>
<td>51</td>
<td>Advanced Manufacturing Technology in China: A Roadmap to 2050</td>
<td>China</td>
<td>Enabling technology</td>
<td>Manufacturing</td>
<td>2010</td>
<td>Roadmap</td>
<td>Chinese Academy of Social Sciences</td>
</tr>
<tr>
<td>52</td>
<td>Foresight of Evolving Security Threats Posed by Emerging Technologies</td>
<td>Europe</td>
<td>Enabling technology</td>
<td>Security issues linked to emerging technologies</td>
<td>2009</td>
<td>Horizon scanning &amp; scenarios</td>
<td>European Commission</td>
</tr>
</tbody>
</table>
10.2. SHORTLISTED CASE STUDIES

Group 1: Non-scenario-based shortlisted case studies

<table>
<thead>
<tr>
<th>N.</th>
<th>NAME</th>
<th>AREA</th>
<th>FIELD</th>
<th>LAUNCH</th>
<th>SPONSOR</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Strategy report on research infrastructures-roadmap 2010</td>
<td>STI</td>
<td>R&amp;I infrastructures</td>
<td>2010</td>
<td>EC</td>
</tr>
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<td>10</td>
<td>Policies for Research and Innovation in Small Member States to advance the European Research Area</td>
<td>STI</td>
<td>R&amp;I system</td>
<td>2009</td>
<td>EC</td>
</tr>
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<td>11</td>
<td>The role of community research policy in the knowledge-based economy</td>
<td>STI</td>
<td>R&amp;I system</td>
<td>2009</td>
<td>EC</td>
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<tr>
<td>14</td>
<td>A reinforced European research area partnership for excellence and growth</td>
<td>STI</td>
<td>R&amp;I system</td>
<td>2012</td>
<td>EC</td>
</tr>
<tr>
<td>26</td>
<td>Citizen Visions on Science, Technology and Innovation (CIVISTI)</td>
<td>STI</td>
<td>STI agenda setting</td>
<td>2009</td>
<td>EC</td>
</tr>
<tr>
<td>28</td>
<td>Visions for Horizon 2020</td>
<td>STI</td>
<td>STI agenda setting</td>
<td>2012</td>
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</table>

Group 2: Scenario-based shortlisted case studies

<table>
<thead>
<tr>
<th>N.</th>
<th>NAME</th>
<th>AREA</th>
<th>FIELD</th>
<th>LAUNCH</th>
<th>SPONSOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Innovation Futures (INFU)</td>
<td>STI</td>
<td>Innovation agenda</td>
<td>2009</td>
<td>EC</td>
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<td>12</td>
<td>Research &amp; Innovation Futures (RIF2030)</td>
<td>STI</td>
<td>R&amp;I system</td>
<td>2011</td>
<td>EC</td>
</tr>
<tr>
<td>13</td>
<td>Forward Visions on the European Research Area (VERA)</td>
<td>STI</td>
<td>R&amp;I system</td>
<td>2012</td>
<td>EC</td>
</tr>
<tr>
<td>36</td>
<td>Global Europe 2050</td>
<td>SC</td>
<td>Europe global challenges</td>
<td>2011</td>
<td>EC</td>
</tr>
<tr>
<td>41</td>
<td>Foresight Security Scenarios: Mapping Research to a Comprehensive Approach to Exogenous EU Roles</td>
<td>SC</td>
<td>Security research</td>
<td>2011</td>
<td>EC</td>
</tr>
</tbody>
</table>
### RECOMMENDATIONS IDENTIFIED IN ‘VISIONS FOR HORIZON 2020’

<table>
<thead>
<tr>
<th></th>
<th>Recommendation</th>
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<tbody>
<tr>
<td>1</td>
<td>Research needs to go beyond technical questions to more controversial areas like global power shifts, sources of the economic crises and malaises affecting political participation, legitimation and self-steering. In such times of deep change, not all statistical relationships will remain stable, and European social knowledge therefore needs both improved databases and theoretical work.</td>
</tr>
<tr>
<td>2</td>
<td>It is particularly important that researchers in the SSH engage scholars in the hard sciences in a joint effort to cultivate research-based innovation regarding the way expertise and democracy interact.</td>
</tr>
<tr>
<td>3</td>
<td>Both in classical foreign policy and in the area of science, technology, and innovation policies, new policies for Europe have to be formulated with unrestrained, cleareyed attention to the depth of these changes. It is important to avoid newspeak such as talking in general terms about abstract changes, challenges and opportunities. Only by concrete analysis of these shifts will it become possible to see the comparative advantages of Europe.</td>
</tr>
<tr>
<td>4</td>
<td>A decentred global power structure creates more room for an actor with historical connections, diplomatic skills, and reflexivity about one’s own values and perspectives. These opportunities can only be realised, if research and social-scientific understanding are allowed to face the unpleasant aspects of the current sea-change, name names, and conduct research that does not emerge under calls phrased in technocratic terms. Societal changes necessarily demand research on highly political issues.</td>
</tr>
<tr>
<td>5</td>
<td>SSH research plays an important role in solving other societal challenges. The necessary cooperation in these areas raises new challenges for both natural sciences and SSH. However, it is equally important that genuine SSH research identifies dramatic societal challenges in its own right. The SSH should be supported in both forms. If seen solely in its first-mentioned role, the SSH risks being reduced to social-engineering and behaviour-manipulation. There is an equal need to analyse issues where the end, and not only the means fall within the realm of SSH research. Conversely, it is important to be aware of the significant contributions of the natural and medical sciences to solving problems defined by the SSH.</td>
</tr>
<tr>
<td>6</td>
<td>EU builds on this reflexive awareness by translating findings among national discourses. We need to know more about the mechanisms that make such translations among nations, domains, and paradigms productive.</td>
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</tbody>
</table>
7 European societies are in rapid transformation. This may change previous patterns and thereby upset established correlations. We therefore not only need statistical data and evidence-based lessons, but, equally so, conceptual and theoretical work on deep shifts in the dynamics of societies. Empirical indicators should be theoretically informed and connected to research questions, rather than to bureaucratic agendas. Production of Europe-wide datasets is important and highly promising. Much more work needs to go into getting this right, as premature lock-in can constrain future research.

8 A timely understanding is needed to determine what it means to thrive in new forms of networks. Concretely, research programmes should be more open to non-European participants. Quality and innovation can only be achieved by cooperating with the best in any given field. ‘European research’ should not mean research inside a European boundary, but Europe-centred and initiated networks.

9 Rather than abstract formulations (avoiding dangers, achieving cooperation), research should be guided towards locating specific challenges in the global constellation, with a willingness to analyse powers and actors concretely and by name (e.g. the rise of China).

10 Europe faces severe economic difficulties of strong social and political importance. Serious attention needs be devoted to understanding the sources, nature, and shape of these crises. Europe is not served by following the widespread fashion of only talking about ‘opportunities’ and ‘challenges’ when research actually can help by investigating the causes of serious problems if allowed to use ‘negative’ designations, also in specific research calls.

11 It will be crucial to connect and contrast knowledge about innovation that emerges ‘bottom up’ from specific fields with more generic innovation research. Ultimately, the challenge is how to be innovative about innovation.

12 Funding multiple (sometimes smaller) projects is often better than huge grants to those ‘safe’ projects that all reviewers support. Real innovation and scientific progress typically arrive in processes that also allow failures; only they generate big winners that are really new. ‘No risk’ strategies are counter-productive.

13 Evaluation criteria and processes must be adjusted to secure multi-disciplinarity. Since this has to be done in a manner that ensures quality and academic standards, innovative assessment systems have to be designed.

14 Open calls, and calls with different degrees of specification, should be included. Detailed specification of calls overreaches the ability to predict the future.

15 High quality should be the main criteria. Increased simplification and trust in researchers and academic institutions are needed. Results matter more than multiple indicators and deliverables.

16 Innovation can be achieved by embedding the ‘problem definition’ with societal actors, citizens, and communities – not limited to the top-down agendas of policy makers and business elites.

17 Knowledge-intensive entrepreneurship particularly of SMEs represents an effective transformative mechanism that can break old barriers and convert new knowledge into economic activity.
<table>
<thead>
<tr>
<th>Page</th>
<th>Text</th>
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<tbody>
<tr>
<td>18</td>
<td>Europe has to foster demand-led innovation. An increase in demand-led innovation means involving industrial users, consumers and clients more in the innovation process and increasing the role that they play in stimulating innovations and new ideas.</td>
</tr>
<tr>
<td>19</td>
<td>The variety in demand articulation requires that the demand for knowledge not be left to private industry and/or government agencies as macroactors, but be democratised and diversified further.</td>
</tr>
<tr>
<td>20</td>
<td>A rhetoric of ‘readiness for change’ has been around for years, happily embraced by leaders in business and politics, but rarely has this been taken as an opportunity for scientifically based structural adjustment.</td>
</tr>
<tr>
<td>21</td>
<td>Comparative case studies would help to identify barriers and solutions. Variations among sectors, regions, and company structures are among the important variables where Europe’s diversity can be better exploited as providing a laboratory. The Chinese technocratic regime runs whole regions as tests. For many reasons, this will likely not be the European way, but existing variations can be much better used as sources of information and learning.</td>
</tr>
<tr>
<td>22</td>
<td>Taking into account the seriousness of recent crises in financial capitalism and the fact that economies increasingly are driven by financial market concerns such as the debt crises and the Euro, the political and economic causes of, not only the crises as such, but also the increasing socio-economic inequalities and tensions along lines of class, geography, ethnicity, gender and generation need to be addressed.</td>
</tr>
<tr>
<td>23</td>
<td>Analyses have to go beyond the technical to a broader examination of interconnected social, economic, and political alterations. Many disciplines, from economic history and comparative institutionalism to macro-sociology, can enrich the understanding of options and constraints.</td>
</tr>
<tr>
<td>24</td>
<td>Throughout Europe, political participation has waned and mistrust to political institutions and elites is prevalent. Yet, simultaneously new forms of involvement and political judgement occur for instance in social media; and collective self-monitoring and steering takes place in networks and expert systems, where contestation and deliberation is performed but not in forms normally recognised as legitimate. This research challenge too is multi-dimensional, because we need to get back to basic “components” of politics such as: participation, legitimacy, contestation, and collective governance – both rethinking and experimenting with new ways to enact these. A particular challenge regards the relation between knowledge and democracy – how to make politics knowledgeable and knowledge responsive and responsible.</td>
</tr>
<tr>
<td>25</td>
<td>Inclusiveness and a resilient society mean greater learning but the financial and institutional conditions necessary to promote more learning are currently absent in many regions and especially in rural communities. Geographical considerations should be an integral part of every policy field, not added as an afterthought separately on regions.</td>
</tr>
<tr>
<td>26</td>
<td>A vision of a better Europe includes all citizens having command over the resources necessary to develop their lives according to their interests and values. This requires less inequality than is currently the case and perhaps, most importantly, that every one has access to a job to earn a living. One essential element is that all children be given a good start to develop their inborn capacities in primary, secondary and if possible tertiary education.</td>
</tr>
<tr>
<td>27</td>
<td>Future research has to be organised in ways that avoid disconnecting more ‘micro’ and local knowledge about, e.g. inclusion, equality, and education from macro conceptions of general processes.</td>
</tr>
<tr>
<td>28</td>
<td>Solely focusing on self-solidification by making Europe’s own systems and societies more resilient is too defeatist and self-defeating – here, international analysis should be the key to formulating effective policies for security.</td>
</tr>
<tr>
<td>29</td>
<td>Research into sources of challenges and thereby into general economic, social, and political transformation – which often demands more abstract theory – is needed to understand the conditions for inclusion, innovation, and security.</td>
</tr>
<tr>
<td>30</td>
<td>SSH can contribute to handling other societal challenges by entering into cooperation with researchers in the ‘hard’ sciences.</td>
</tr>
<tr>
<td>31</td>
<td>To enable social scientists to go beyond the borders of their national statistics and address border-crossing issues concerning innovation, inclusion, and security production, access to empirical data concerning a wide range of social scientific and humanistic issues should be underpinned through a common, European data strategy.</td>
</tr>
<tr>
<td>32</td>
<td>Technology should be linked to the advancement of civic education projects designed to further involvement of citizens.</td>
</tr>
<tr>
<td>33</td>
<td>New technologies can provide new opportunities in the collection of empirical material about current transformations and it can also be utilised to develop new ways of disseminating knowledge and entering into public discussion for the SSH.</td>
</tr>
<tr>
<td>34</td>
<td>Researchers should explicitly acknowledge and analyse the tensions between conflicting aims and principles. SSH research holds the potential to expose the hard tradeoffs, policy dilemmas, and both intended and unintended effects of existing and proposed policies.</td>
</tr>
<tr>
<td>35</td>
<td>An important – and novel – research agenda concerns the interaction between the capacity for communication /translation among subsystems (such as science and the economy, intelligence agencies and parliaments) and among nations.</td>
</tr>
<tr>
<td>36</td>
<td>Careful attention to the involvement of stakeholders in research should be attended to closely from the start; for example, to the actors who play a relevant role in an innovation system and those who could be included in a policy framework.</td>
</tr>
<tr>
<td>37</td>
<td>New indicators and new metrics need to support implementation and policies. Efforts should be devoted to launch indicators that are more in tune with innovation in a knowledge-based society.</td>
</tr>
<tr>
<td>38</td>
<td>A knowledge-based system tends to operate in terms of uncertainties and expectations, differently than that of a classical political economy. The dynamics are more footloose and less embedded, but models of anticipatory systems, e.g. simulations, can help to expose the various dynamics of expectations.</td>
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<tr>
<td>39</td>
<td>A crucial task in research and innovation policy is to convince stakeholders, at various levels and in various sectors, of the opportunities of knowledge-intensive governance. A key factor shaping relations between practice and research is what culture and attitude around science and knowledge the government and political elites convey.</td>
</tr>
<tr>
<td>40</td>
<td>Research should go beyond government and industry, cultivating links to social movements, NGOs, and representatives of civic society in order to find the most viable solutions</td>
</tr>
<tr>
<td>41</td>
<td>Excellence in research, social impact and contributions from various disciplines should be reflected in the evaluation criteria and processes</td>
</tr>
<tr>
<td>42</td>
<td>New way of cooperating should be developed, for example by supporting collaborative research, particularly in fields where sharing equipment due to financial constraints is not necessary (as it is in parts of the natural and medical sciences, where consequently cooperation is more easily fostered).</td>
</tr>
<tr>
<td>43</td>
<td>Doing comparative research and confronting different methodologies, references, and repertories with each other, are necessary, but the amount of national funding available for this kind of research is often limited</td>
</tr>
<tr>
<td>44</td>
<td>Maintaining a high level of excellence and staying focused on targeted scientific objectives means that the size of research networks must be adapted to suit the objectives. In practice, small and medium-sized projects guarantee excellence and quality results</td>
</tr>
<tr>
<td>45</td>
<td>Encouraging the early setup of networks is productive to developing strong scientific collaborations, especially as certain fields in the social science and humanities community are still quite fragmented.</td>
</tr>
<tr>
<td>46</td>
<td>Funding social platforms also seems to be a good approach for involving stakeholders in defining research agendas.</td>
</tr>
<tr>
<td>47</td>
<td>‘Societal challenges’ research often happens at the intersection of policy-oriented expertise and academic knowledge anchored in university departments. If the distinct social roles and internal dynamics of these communities are recognised – and mutually respected – it is possible to optimise procedures, deliverables, and funding regimes for the purpose of getting the two (here ideal-typically categorised) communities to challenge each other in helpful ways.</td>
</tr>
<tr>
<td>48</td>
<td>Old conceptions of basic and applied research have been overtaken by a new situation, where often frontier research happens ‘in the context of application’. Identifying with precision all of the needs and potentials of European research in advance is impossible, but articulating what they might be is an ambition worth pursuing. Thus, finding a way to give scholars the opportunity to communicate research priorities with reference to an ever-changing world is important.</td>
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<tr>
<td>49</td>
<td>Given the existence of ‘fully open’ calls under ERC, closing the gap might be achieved through scaling, where some calls within each grand societal challenge are more specified, and others are at a higher level of generalisation, allowing for not-yet-defined agendas to emerge and be pursued. This would be an innovation compared to previous approaches, where the procedure has been to subdivide and subdivide to a certain, but relatively consistent degree of specification. Premature lock-in can be avoided by supplementing this with more general, open and competitive calls covering a large part of the theme.</td>
</tr>
<tr>
<td>50</td>
<td>To adopt innovative practises in the way societal actors compete and cooperate to achieve inclusion, innovation, and security, it is necessary to both generate societal knowledge about the changing nature of these social ‘values’ – inclusion, innovation, and security are not stable goals, but change their meaning and form under new conditions – and to make it relevant to especially those actors who shape processes and conditions for others.</td>
</tr>
<tr>
<td>51</td>
<td>In relation to the market and growth, promoting diffusion by identifying the relevant actors and networks of knowledge and promoting inter-organisational networks of learning will be useful.</td>
</tr>
<tr>
<td>52</td>
<td>A further democratisation of the demand for innovation may help to break the oligopoly of global players on knowledge markets.</td>
</tr>
<tr>
<td>53</td>
<td>Entrusting the dissemination and exploitation of results to ‘experts in dissemination’ is probably a way to shorten the path from research to the benefit of citizens. The scientific coordinator of a research project is not necessarily the best actor for promoting ideas on these issues or for managing this type of work. A solution could consist of developing dedicated calls for proposals to fund support projects on the dissemination and exploitation of research projects.</td>
</tr>
<tr>
<td>54</td>
<td>Open access to data and findings is crucial to facilitating wide access to research results by all kinds of communities and has to be strongly supported and developed.</td>
</tr>
<tr>
<td>55</td>
<td>Innovation has been around as a slogan long enough that there is a risk of taking a static understanding of it. A key task for Europe is to become innovative about innovation, and the social sciences and humanities have important contributions to make, especially when innovation is analysed in association with inclusion and security.</td>
</tr>
</tbody>
</table>
10.3.2. Questionnaire for Visions for Horizon 2020

UNDERSTANDING THE GENERATION OF R&I POLICY ADVICE
WITH FORESIGHT PROCESSES

This brochure consists of three parts: a preliminary data and research information, a questionnaire, and some filling instructions. Your answering will be highly appreciated.

Once the questionnaire has been completed, please submit it (an electronic template of the questionnaire will be provided) by email to:

Guillermo Velasco
E-mail: guillermo.velasco@postgrad.mbs.ac.uk

Or you may send it by post to the following address:

Guillermo Velasco
Manchester Institute of Innovation Research (MloIR), The University of Manchester, Manchester, UK

Identification:
1. Name _______________________________________________________________________
2. Country _______________________________________________________________________
3. Title/ Position ___________________________________________________________________
4. Organisation _____________________________________________________________________
5. Organisation activity _____________________________________________________________
6. Main activity within the Organisation _____________________________________________

Research context and objectives

The new European research funding programme Horizon 2020 should contribute to enhance the development of the European Research Area (ERA). Among others, the programme will finance new initiatives to support research and innovation governance, actor's participation, interdisciplinary forms of research collaboration, or the development of research performance indicators. Given that there are significant regional disparities across Europe in R&I, the harmonisation of national RTDI strategies will be also actively pursued in order to close the gap between countries.

During the last years, several future-oriented studies have informed and assisted the H2020 design process. Different actors have interacted and contributed with their expertise to identify research and innovation priorities, analyse research integration obstacles, define stakeholder's strategies and propose plausible new schemes for research governance.

In this context, this research aims to understand how highly participatory future-oriented studies have contributed to deliver recommendations to the policy sphere, and to analyse how this sort of practices may facilitate the generation of more consistent advises in the future.

Rationales supporting the recommendations presented in this questionnaire

This questionnaire has been designed to evaluate a sample of policy-oriented recommendations. To evaluate their characteristics it is necessary not only to understand the context in which they were generated, but also the main objectives that these recommendations have tried to address, as follows:

- Strengthening the evidence base and support for the Innovation Union and ERA
- Closing the research and innovation divide in Europe
**QUESTIONNAIRE**

Please assess the following RECOMMENDATIONS
Scale: 1-4, see instructions annex
Originality, Necessity, Sufficiency, Collateral effects and Feasibility

<table>
<thead>
<tr>
<th></th>
<th>ORIGINALITY</th>
<th>NECESSITY</th>
<th>ABSENCE OF NEGATIVE CONSEQUENCES</th>
<th>FEASIBILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Evaluation criteria must be adjusted to secure <strong>multi-disciplinarity</strong>. Since this has to be done in a manner that ensures quality and academic standards, <strong>innovative assessment systems</strong> have to be designed.</td>
<td></td>
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<td>2</td>
<td>Europe has faced severe economic difficulties of strong social and political import. Serious attention needs be devoted to understanding the sources, nature, and shape of these crises. Europe is not served by following the widespread fashion of only talking about ‘opportunities’ and ‘challenges’ when research actually can help by investigating the causes of serious problems if allowed to use ‘negative’ designations, also in specific research calls.</td>
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<td>4</td>
<td>Researchers should explicitly acknowledge and <strong>analyse the tensions</strong> between conflicting aims and principles. Social Sciences and Humanities research holds the potential to expose the hard tradeoffs, policy dilemmas, and both intended and unintended effects of existing and proposed policies.</td>
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<tr>
<td>5</td>
<td>New indicators and new metrics need to support implementation and policies. Efforts should be devoted to launch <strong>indicators that are more in tune with innovation</strong> in a knowledge-based society.</td>
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<td>6</td>
<td>Entrusting the dissemination and exploitation of results to &quot;<strong>experts in dissemination</strong>&quot; is probably a way to shorten the path from research to the benefit of citizens. The scientific coordinator of a research project is not necessarily the best actor for promoting ideas on these issues or for managing this type of work. A solution could consist of developing dedicated calls for proposals to fund support projects on the dissemination and exploitation of research projects.</td>
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<td>It is particularly important that <strong>researchers in the SSH engage scholars in the hard sciences</strong> in a joint effort to cultivate research-based innovation regarding the way expertise and democracy interact.</td>
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<td><strong>Funding multiple (sometimes smaller) projects</strong> is often better than huge grants to those ‘safe’ projects that all reviewers support. Real innovation and scientific progress typically arrive in processes that also allow failures; only they generate big winners that are really new. ‘No risk’ strategies are counter-productive.</td>
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Societal challenges research often happens at the intersection of policy-oriented expertise and academic knowledge anchored in university departments. If the distinct social roles and internal dynamics of these communities are recognised – and mutually respected – it is possible to optimise procedures, deliverables, and funding regimes for the purpose of getting the two communities to challenge each other in helpful ways.

Rather than abstract formulations (avoiding dangers, achieving cooperation), research should be guided towards locating specific challenges in the global constellation, with a willingness to analyse powers and actors concretely and by name (e.g. the rise of China).

Throughout Europe, political participation has waned and mistrust to political institutions and elites is prevalent. Yet, simultaneously new forms of involvement and political judgement occur for instance in social media; and collective self-monitoring and steering takes place in networks and expert systems, where contestation and deliberation is performed but not in forms normally recognised as legitimate. This research challenge too is multi-dimensional, because we need to get back to basic “components” of politics such as: participation, legitimacy, contestation, and collective governance – both rethinking and experimenting with new ways to enact these. A particular challenge regards the relation between knowledge and democracy – how to make politics knowledgeable and knowledge responsive and responsible.  

A knowledge-based system tends to operate in terms of uncertainties and expectations, differently than that of a classical political economy. The dynamics are more footloose and less embedded, so different models of anticipatory systems, e.g. simulations, can help to expose the various dynamics of such expectations.

New ways of cooperating should be developed, for example by supporting collaborative research, particularly in fields where sharing equipment due to financial constraints is not necessary (as it is in parts of the natural and medical sciences, where consequently cooperation is more easily fostered).

Comparative case studies would help to identify barriers and solutions. Variations among sectors, regions, and company structures are among the important variables where Europe’s diversity can be better exploited as providing a laboratory. The Chinese technocratic regime runs whole regions as tests. For many reasons, this will likely not be the European way, but existing variations can be much better used as sources of information and learning.

Innovation should be achieved by embedding the ‘problem definition’ with societal actors, citizens, and communities – not limited to the top-down agendas of policy makers and business elites.

It will be crucial to connect and contrast knowledge about innovation that emerges “bottom up” from specific fields with more generic innovation research. Ultimately, the challenge is how to be innovative about innovation.
## ASSESSMENT INSTRUCTIONS

### ORIGINALITY

(1: not imaginative, 4: highly imaginative)
The aim is to assess the originality of the recommendation drawing on your own experience, or in relation to the recommendations generated in other projects or initiatives.

<table>
<thead>
<tr>
<th>Evaluation scale detail:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: The recommendation is not imaginative</td>
</tr>
<tr>
<td>2: The action is moderately imaginative</td>
</tr>
<tr>
<td>3: The action is imaginative</td>
</tr>
<tr>
<td>4: The action is highly imaginative</td>
</tr>
</tbody>
</table>

### NECESSITY

(2: no necessary, 4: highly necessary)
The aim is to assess the necessity of the recommendation to fulfil its objective, i.e. analyse the existence of other alternatives.

<table>
<thead>
<tr>
<th>Evaluation scale detail:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: The action is not necessary: there are plenty of other realistic better alternatives</td>
</tr>
<tr>
<td>2: There are several better alternatives to be considered</td>
</tr>
<tr>
<td>3: There are very few other alternatives to be considered</td>
</tr>
<tr>
<td>4: The action is highly necessary because there are no other realistic alternatives</td>
</tr>
</tbody>
</table>

### SUFFICIENCY

(1: not sufficient, 4: highly sufficient)
In this section we will assess the capacity of the actions to solve the problem or to satisfy the objectives within the horizon of the exercise.

<table>
<thead>
<tr>
<th>Evaluation scale detail:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: The action is not able to fulfil the objectives by itself</td>
</tr>
<tr>
<td>2: The action needs to be accompanied by many complementary tasks to fulfil the objectives</td>
</tr>
<tr>
<td>3: The action needs to be accompanied by only a few complementary tasks to fulfil the objectives</td>
</tr>
<tr>
<td>4: The action is highly capable of fulfilling the objectives by itself</td>
</tr>
</tbody>
</table>

### ABSENCE OF NEGATIVE COLLATERAL EFFECTS

(1: very important collateral negative effects, 4: absence of collateral effects)
Here the negative collateral consequences that the recommendations may have over any system actor are assessed. The consequences to be considered may be technologic, economic, political, social, environmental or ethical.

<table>
<thead>
<tr>
<th>Evaluation scale detail:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: The action implies very important collateral effect</td>
</tr>
<tr>
<td>2: The action implies important negative collateral effects</td>
</tr>
<tr>
<td>3: The action implies moderate negative collateral effects</td>
</tr>
<tr>
<td>4: The action implies no negative collateral effects</td>
</tr>
</tbody>
</table>

### FEASIBILITY

(1: unfeasible, 4: feasible)
Please assess the feasibility of implementing the recommended actions with the available resources.

<table>
<thead>
<tr>
<th>Evaluation scale detail:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: It is impossible to implement the action</td>
</tr>
<tr>
<td>2: The action is unfeasible, unless many new resources are added</td>
</tr>
<tr>
<td>3: The action is feasible with a moderate adding of new resources</td>
</tr>
<tr>
<td>4: The actions is feasible with the existing resources</td>
</tr>
</tbody>
</table>
10.3.3. Results on Visions for Horizon 2020 questionnaire

| Recommendations SAMPLE (highest and lowest scores are cell-coloured, read vertically) | Soundness assessment |
|---|---|---|---|---|---|
| **A** Evaluation criteria must be adjusted to secure **multi-disciplinarity**. Since this has to be done in a manner that ensures quality and academic standards, **innovative assessment systems** have to be designed. | **Originality** | **Necessity** | **Sufficiency** | **Collateral effect** | **Feasibility** | **Total Soundness** |
| | 2.38 | 3.23 | 2.38 | 3.15 | 3.08 | **14.22** |
| **B** Europe has faced severe economic difficulties of strong social and political import. Serious attention needs be devoted to understanding the sources, nature, and shape of these crises. Europe is not served by following the widespread fashion of only talking about ‘opportunities’ and ‘challenges’ when research actually can help by **investigating the causes of serious problems** if allowed to use ‘negative’ designations, also in specific research calls. | | | | | | **13.00** |
| **C** Research needs to go beyond technical questions to more **controversial areas** like global power shifts, sources of the economic crises and malaises affecting political participation, legitimacy and self-steering. | | | | | | **13.39** |
| **D** Researchers should explicitly acknowledge and **analyse the tensions** between conflicting aims and principles. Social Sciences and Humanities research holds the potential to expose the hard trade offs, policy dilemmas, and both intended and unintended effects of existing and proposed policies. | | | | | | **13.85** |
| **E** New indicators and new metrics need to support implementation and policies. Efforts should be devoted to launch **indicators that are more in tune with innovation** in a knowledge-based society. | | | | | | **14.15** |
| **F** Entrusting the dissemination and exploitation of results to "experts in dissemination" is probably a way to shorten the path from research to the benefit of citizens. The scientific coordinator of a research project is not necessarily the best actor for promoting ideas on these issues or for managing this type of work. A solution could consist of developing dedicated calls for proposals to fund support projects on the dissemination and exploitation of research projects. | | | | | | **13.08** |
| **G** Europe has to foster **demand-led innovation**. An increase in demand-led innovation means involving industrial users, consumers and clients more in the innovation process and increasing the role that they play in stimulating innovations and new ideas. | | | | | | **13.93** |
| **H** It is particularly important that **researchers in the SSH engage scholars in the hard sciences** in a joint effort to cultivate research-based innovation regarding the way expertise and democracy interact. | | | | | | **13.24** |
| **I** **Funding multiple (sometimes smaller) projects** is often better than huge grants to those ‘safe’ projects that all reviewers support. Real innovation and scientific progress typically arrive in processes that also allow failures; only they generate big winners that are really new. ‘No risk’ strategies are counter-productive. | | | | | | **13.70** |
An important – and novel – research agenda concerns the interaction between the capacity for communication /translation among subsystems (such as science and the economy, intelligence agencies and parliaments) and among nations.

Societal challenges research often happens at the intersection of policy-oriented expertise and academic knowledge anchored in university departments. If the distinct social roles and internal dynamics of these communities are recognised – and mutually respected – it is possible to optimise procedures, deliverables, and funding regimes for the purpose of getting the two communities to challenge each other in helpful ways.

Rather than abstract formulations (avoiding dangers, achieving cooperation), research should be guided towards locating specific challenges in the global constellation, with a willingness to analyse powers and actors concretely and by name (e.g. the rise of China).

Throughout Europe, political participation has waned and mistrust to political institutions and elites is prevalent. Yet, simultaneously new forms of involvement and political judgement occur for instance in social media; and collective self-monitoring and steering takes place in networks and expert systems, where contestation and deliberation is performed but not in forms normally recognised as legitimate.

This research challenge too is multi-dimensional, because we need to get back to basic "components" of politics such as: participation, legitimacy, contestation, and collective governance – both rethinking and experimenting with new ways to enact these. A particular challenge regards the relation between knowledge and democracy – how to make politics knowledgeable and knowledge responsive and responsible.

A knowledge-based system tends to operate in terms of uncertainties and expectations, differently than that of a classical political economy. The dynamics are more footloose and less embedded, so different models of anticipatory systems, e.g. simulations, can help to expose the various dynamics of such expectations.

New ways of cooperating should be developed, for example by supporting collaborative research, particularly in fields where sharing equipment due to financial constraints is not necessary (as it is in parts of the natural and medical sciences, where consequently cooperation is more easily fostered).

Comparative case studies would help to identify barriers and solutions. Variations among sectors, regions, and company structures are among the important variables where Europe’s diversity can be better exploited as providing a laboratory. The Chinese technocratic regime runs whole regions as tests. For many reasons, this will likely not be the European way, but existing variations can be much better used as sources of information and learning.

Innovation should be achieved by embedding the ‘problem definition’ with societal actors, citizens, and communities – not limited to the top-down agendas of policy makers and business elites.

It will be crucial to connect and contrast knowledge about innovation that emerges ‘bottom up’ from specific fields with more generic innovation research. Ultimately, the challenge is how to be innovative about innovation.

| J | An important – and novel – research agenda concerns the interaction between the capacity for communication /translation among subsystems (such as science and the economy, intelligence agencies and parliaments) and among nations. | 2.54 | 3.31 | 2.69 | 3.38 | 2.62 | 14.54 |
| K | Societal challenges research often happens at the intersection of policy-oriented expertise and academic knowledge anchored in university departments. If the distinct social roles and internal dynamics of these communities are recognised – and mutually respected – it is possible to optimise procedures, deliverables, and funding regimes for the purpose of getting the two communities to challenge each other in helpful ways. | 2.23 | 2.92 | 2.69 | 3.23 | 2.69 | 13.76 |
| L | Rather than abstract formulations (avoiding dangers, achieving cooperation), research should be guided towards locating specific challenges in the global constellation, with a willingness to analyse powers and actors concretely and by name (e.g. the rise of China). | 2.62 | 2.77 | 2.15 | 2.46 | 3.00 | 13.00 |
| M | Throughout Europe, political participation has waned and mistrust to political institutions and elites is prevalent. Yet, simultaneously new forms of involvement and political judgement occur for instance in social media; and collective self-monitoring and steering takes place in networks and expert systems, where contestation and deliberation is performed but not in forms normally recognised as legitimate. This research challenge too is multi-dimensional, because we need to get back to basic “components” of politics such as: participation, legitimacy, contestation, and collective governance – both rethinking and experimenting with new ways to enact these. A particular challenge regards the relation between knowledge and democracy – how to make politics knowledgeable and knowledge responsive and responsible. | 2.54 | 3.00 | 2.46 | 2.77 | 2.69 | 13.46 |
| N | A knowledge-based system tends to operate in terms of uncertainties and expectations, differently than that of a classical political economy. The dynamics are more footloose and less embedded, so different models of anticipatory systems, e.g. simulations, can help to expose the various dynamics of such expectations. | 3.08 | 2.92 | 2.62 | 3.23 | 2.77 | 14.62 |
| O | New ways of cooperating should be developed, for example by supporting collaborative research, particularly in fields where sharing equipment due to financial constraints is not necessary (as it is in parts of the natural and medical sciences, where consequently cooperation is more easily fostered). | 1.77 | 3.00 | 2.54 | 3.31 | 3.08 | 13.70 |
| P | Comparative case studies would help to identify barriers and solutions. Variations among sectors, regions, and company structures are among the important variables where Europe’s diversity can be better exploited as providing a laboratory. The Chinese technocratic regime runs whole regions as tests. For many reasons, this will likely not be the European way, but existing variations can be much better used as sources of information and learning. | 2.15 | 2.62 | 2.23 | 3.15 | 3.23 | 13.38 |
| Q | Innovation should be achieved by embedding the ‘problem definition’ with societal actors, citizens, and communities – not limited to the top-down agendas of policy makers and business elites. | 2.38 | 3.08 | 2.62 | 3.15 | 3.00 | 14.23 |
| R | It will be crucial to connect and contrast knowledge about innovation that emerges ‘bottom up’ from specific fields with more generic innovation research. Ultimately, the challenge is how to be innovative about innovation. | 2.77 | 3.31 | 2.23 | 3.38 | 2.85 | 14.54 |
| Total mark | 2.50 | 2.94 | 2.38 | 3.05 | 2.90 | 13.76 |
## 10.3.4. Example of V2020 soundness assessment typology

<table>
<thead>
<tr>
<th>‘Visions for Horizon 2020’ soundness assessment</th>
<th>Necessity</th>
<th>Sufficiency</th>
<th>Feasibility</th>
<th>Collat. effect</th>
<th>TYPE OF ADVICE ACCORDING TO SOUNNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Evaluation criteria must be adjusted to secure multi-disciplinarity. Since this has to be done in a manner that ensures quality and academic standards, innovative assessment systems have to be designed.</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>INSUFFICIENT (MORE ACTIONS ARE REQUESTED)</td>
</tr>
<tr>
<td>B Europe has faced severe economic difficulties of strong social and political import. Serious attention needs to be devoted to understanding the sources, nature, and shape of these crises. Europe is not served by following the widespread fashion of only talking about ‘opportunities’ and ‘challenges’ when research actually can help by investigating the causes of serious problems if allowed to use ‘negative’ designations, also in specific research calls.</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>INSUFFICIENT (MORE ACTIONS ARE REQUESTED)</td>
</tr>
<tr>
<td>C Research needs to go beyond technical questions to more controversial areas like global power shifts, sources of the economic crises and malaises affecting political participation, legitimacy and self-steering.</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>INSUFFICIENT (MORE ACTIONS ARE REQUESTED)</td>
</tr>
<tr>
<td>D Researchers should explicitly acknowledge and analyse the tensions between conflicting aims and principles. Social Sciences and Humanities research holds the potential to expose the hard trade-offs, policy dilemmas, and both intended and unintended effects of existing and proposed policies.</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>SOUND ADVICE</td>
</tr>
<tr>
<td>E New indicators and new metrics need to support implementation and policies. Efforts should be devoted to launch indicators that are more in tune with innovation in a knowledge-based society.</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>INSUFFICIENT (MORE ACTIONS ARE REQUESTED)</td>
</tr>
<tr>
<td>F Entrusting the dissemination and exploitation of results to “experts in dissemination” is probably a way to shorten the path from research to the benefit of citizens. The scientific coordinator of a research project is not necessarily the best actor for promoting ideas on these issues or for managing this type of work. A solution could consist of developing dedicated calls for proposals to fund support projects on the dissemination and exploitation of research projects.</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>MORE DELIBERATION ON ALTERNATIVES AND ACTIONS ARE NEEDED</td>
</tr>
<tr>
<td>G Europe has to foster demand-led innovation. An increase in demand-led innovation means involving industrial users, consumers and clients more in the innovation process and increasing the role that they play in stimulating innovations and new ideas.</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>SOUND ADVICE</td>
</tr>
<tr>
<td>H It is particularly important that researchers in the SSH engage scholars in the hard sciences in a joint effort to cultivate research-based innovation regarding the way expertise and democracy interact.</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>INSUFFICIENT (MORE ACTIONS ARE REQUESTED)</td>
</tr>
<tr>
<td>I Funding multiple (sometimes smaller) projects is often better than huge grants to those ‘safe’ projects that all reviewers support. Real innovation and scientific progress typically arrive in processes that also allow failures; only they generate big winners that are really new. ‘No risk’ strategies are counter-productive.</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>INSUFFICIENT (MORE ACTIONS ARE REQUESTED)</td>
</tr>
<tr>
<td>J An important – and novel – research agenda concerns the interaction between the capacity for communication/translation among subsystems (such as science and the economy, intelligence agencies and parliaments) and among nations.</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>SOUND ADVICE</td>
</tr>
<tr>
<td>K</td>
<td>Societal challenges research often happens at the intersection of policy-oriented expertise and academic knowledge anchored in university departments. If the distinct social roles and internal dynamics of these communities are recognised – and mutually respected – it is possible to optimise procedures, deliverables, and funding regimes for the purpose of getting the two communities to challenge each other in helpful ways.</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>L</td>
<td>Rather than abstract formulations (avoiding dangers, achieving cooperation), research should be guided towards locating specific challenges in the global constellation, with a willingness to analyse powers and actors concretely and by name (e.g. the rise of China).</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>M</td>
<td>Throughout Europe, political participation has waned and mistrust to political institutions and elites is prevalent. Yet, simultaneously new forms of involvement and political judgement occur for instance in social media; and collective self-monitoring and steering takes place in networks and expert systems, where contestation and deliberation is performed but not in forms normally recognised as legitimate. This research challenge too is multi-dimensional, because we need to get back to basic “components” of politics such as: participation, legitimacy, contestation, and collective governance – both rethinking and experimenting with new ways to enact these. A particular challenge regards the relation between knowledge and democracy – how to make politics knowledgeable and knowledge responsive and responsible.</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>N</td>
<td>A knowledge-based system tends to operate in terms of uncertainties and expectations, differently than that of a classical political economy. The dynamics are more footloose and less embedded, so different models of anticipatory systems, e.g. simulations, can help to expose the various dynamics of such expectations.</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>O</td>
<td>New ways of cooperating should be developed, for example by supporting collaborative research, particularly in fields where sharing equipment due to financial constraints is not necessary (as it is in parts of the natural and medical sciences, where consequently cooperation is more easily fostered).</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>P</td>
<td>Comparative case studies would help to identify barriers and solutions. Variations among sectors, regions, and company structures are among the important variables where Europe’s diversity can be better exploited as providing a laboratory. The Chinese technocratic regime runs whole regions as tests. For many reasons, this will likely not be the European way, but existing variations can be much better used as sources of information and learning.</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Q</td>
<td>Innovation should be achieved by embedding the ‘problem definition’ with societal actors, citizens, and communities – not limited to the top-down agendas of policy makers and business elites.</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>R</td>
<td>It will be crucial to connect and contrast knowledge about innovation that emerges ‘bottom up’ from specific fields with more generic innovation research. Ultimately, the challenge is how to be innovative about innovation.</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
### 10.3.5. Classification of V2020 recommendations by implementation character

<table>
<thead>
<tr>
<th>Action character</th>
<th>Reference</th>
<th>Type of action</th>
<th>Number of recommendations</th>
<th>%</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
<td>Present</td>
<td>Emerging</td>
<td>24</td>
<td>44</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>Past</td>
<td>Recovering</td>
<td>8</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Conservative</td>
<td>Up</td>
<td>Reinforcing</td>
<td>14</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Equal</td>
<td>Maintaining</td>
<td></td>
<td></td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Down</td>
<td>Decreasing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concluding</td>
<td>Latency</td>
<td>Freezing</td>
<td></td>
<td></td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>End</td>
<td>Ceasing</td>
<td>5</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Combining</td>
<td>Internal</td>
<td>Merging</td>
<td>4</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>External</td>
<td>Adding</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## 10.3.6. Classification of V2020 recommendations by policy nature

<table>
<thead>
<tr>
<th>Measures for improving policy mechanisms</th>
<th>Agenda-setting mechanisms and procedures</th>
<th>13%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Policy formulation improvements</td>
<td>7%</td>
</tr>
<tr>
<td></td>
<td>Policy implementation measures</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>Policy monitoring &amp; evaluation improvements</td>
<td>0%</td>
</tr>
<tr>
<td>Measures for improving innovation from a supply-side perspective</td>
<td>Institutional support of public research institutes</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Financial incentives: support programmes/ tax exemptions</td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td>Research funding criteria definition</td>
<td>9%</td>
</tr>
<tr>
<td></td>
<td>Infrastructure creation and adjustments</td>
<td>4%</td>
</tr>
<tr>
<td></td>
<td>Measures to increase competition and technology transfer: international cooperation, networks, alliances promotion</td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td>Measures to increase knowledge transfer: new actors, networks, academic alliances, information access, internationalisation</td>
<td>27%</td>
</tr>
<tr>
<td></td>
<td>Education and formation</td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td>Innovation management: organisational adjustments, capacity building</td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td>Awareness building and scientific consultancy: strategic intelligence, scientific advice for research</td>
<td>2%</td>
</tr>
<tr>
<td>Measures for improving innovation from a demand-side perspective</td>
<td>Regulation: IPR, labour, competition policy and admin. Framework</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Creation of or supporting the creation of companies</td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td>Public procurement and public leading innovation uses</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Support of private demand: catalytic procurement, demand subsides</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Enable / Marketing: training, awareness measures</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Regulation: norms for production, performance, usage</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Demand construction and articulation initiatives</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>Strategic intelligence for private &amp; public demand</td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td>Combination of demand measures &amp; supply/demand</td>
<td>0%</td>
</tr>
<tr>
<td>STI agenda setting</td>
<td>STI priority areas to invest and reinforce</td>
<td>0%</td>
</tr>
<tr>
<td>R&amp;I priority areas: further research, support and funding (research agenda setting)</td>
<td>16%</td>
<td></td>
</tr>
</tbody>
</table>
10.4. VERA SUPPORTING INFORMATION

10.4.1. VERA scenarios

Scenario 1
“Scenario 1 assumes that present-day European Research Area gradually evolves into what one might call a Global Innovation Area, where research is mainly legitimised by its contribution to innovativeness, competitiveness and growth. As a result of limited public funds, growing inequalities between Member States and the jostling for political influence within Europe, private actors, mainly firms, dominate the financing of the research landscape and thus the setting of research priorities. The coordination and integration of worldwide research, technological development and innovation are primarily managed by global, vertical networks and value chains. As a consequence of a series of financial crises, the variety of approaches to economic recovery has led to locked-in growing inequalities between countries and regions within the EU.

Due to economic heterogeneity, political jostling has increased, impeding joint action. The financial situation across Member States remains heterogeneous and unpredictable, leading to most European companies focusing on short-term economic survival in a turbulent financial landscape, and to more risk-averse spending in RTDI. The research landscape in Europe is mainly driven by technology intensive sectors concentrated in the stronger, globally interconnected regional economies. The bulk of RTDI activity is carried out by specialised supplier firms; however, financial constraints and cost reduction strategies have split the organisational research landscape into private research providers, joint ventures between big firms, and public-private consortia. Competition for the limited number of RTDI jobs remains high.

Scenario 2
In scenario 2 present-day European Research Area has developed its research and innovation capacities incrementally as efficient responses to the Grand Challenges. This means that economic growth and job creation have become challenges themselves, and that issues like climate change or health protection are perceived as Grand Challenges. In Europe as is the case globally, RTDI and education are considered key preconditions for the creation of sound solutions to these Grand Challenges. As a response to the increased relevance of the latter, the Member States have adopted a pragmatic and efficiency-driven view on European integration and support the integration process as a precondition for joint action. With regard to the governance of research, technological development and innovation, this means that national governments are in the driving seat, but also regions turn out to be powerful political actors. Compared to the ERA of 2013, thematically-oriented
approaches have become more important, taking into account the different economic and innovative capacities across European regions and states. The majority of the world’s RTDI capacities are located in highly specialised regional hubs and innovation systems. In Europe, public and private RTDI is influenced by the regions’ various specialisations and organised into thematic, cross-sectoral “hot spots” to tackle mostly ecological and health-related Grand Challenges. These “hot spots” reflect the different innovative and research capacities of European regions; however, most regions are competitive in specific domains. The development and integration of these specialised RTDI capacities is not least the product of effective European-level governance.

Scenario 3

Scenario 3 captures the vision that present-day concept of progress is transformed into a human-centred rationale, where e.g. happiness and quality of life are operationalised into new measures of progress. The after-effects of the global economic crisis are felt deep into the 2020s, and especially so in specific European Member States. Rather than driving societies and Member States apart, economic disparities in Europe create a new sense of community in the pursuit of well-being for all, including the RTDI system. Research and innovation in Europe are transparent and open to individual or societal needs, e.g. regarding new ways of living together, health and data privacy. The main new element in the governance of research, technology development and innovation is the increased participation of citizens. Overall, bottom-up principles become more important in European RTDI governance. Rather than striving for an alignment of policies at a supra-national level, regional and national RTDI governments try to retain the strengths of their individual approaches and share good practice at European level. The now realised institutional structure at EU-level supports policy learning and responsiveness to societal inputs. The open landscape for research, technology development and innovation provides a good basis for close ties with society around micro/regional level activities where society can become involved and/or invest. As systems innovations for human well-being often require additional critical masses, this leads to more private public, transdisciplinary and transnational research networks. A research career as a means to reach individual fulfilment is very attractive; however, the resulting supply of qualified researchers exceeds the new demand for RTDI related to human well-being.

Scenario 4

Scenario 4 is based on the assumption that present-day economic rationales (jobs and growth) have been transformed into an approach where a sustainable development path is viewed as the main rationale of progress. Human activities are limited by resource availability and the carrying capacities of ecosystems at all levels – ranging from local cultivation of land to the use of global commons such as the atmosphere. The sustainability
rationale has therefore been adopted around the globe, but at different speeds and in a variety of ways. European-level coordination and policies play a strong role in steering research, technological development and innovation towards the overall goal and, at the same time, in worldwide networking and managing international collaboration. Permanent consultation processes with experts and stakeholders at all levels complement the approach. The science-in-society contract binds RTDI to deliver value with regard to sustainability – if the research system fails, the science-in-society contract will collapse. Research is funded by a wide range of actors, who define programmes primarily to deliver useful outcomes for sustainable development. In particular in Europe and the Americas, private and public sector research is increasingly complemented by citizen science. As doing sustainability research becomes 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. Citizens are integrated in institutionalised research projects, but also initiate and carry out their own research projects. This broadening of RTDI actors is reinforced through local sustainability initiatives.
### 10.4.2. Strategic debate 1: facilitators’ guide

| 09:15 - 10:00 (45 min) | **Objective of Introduction:** To explain the overall WP5 strategy as well the FG tasks and objectives.  
- (30 min) Presentation on VERA scenarios and WP5.  
- (5 min) Participants will be asked to vote (raising hands) on the ‘least desirable’ scenario (for them) by 2030.  
- (5 min) Top 3 scenarios will be allocated to 3 discussion groups (3 participants + 1 facilitator + 1 rapporteur).  
- (5 min) Participants will be asked to indicate (raising hands) and comment on their ‘most desirable’ scenario. |
|------------------------|-------------------------------------------------------------------------------------------------|
| 10:00 - 11:00 (60 min) | **Objective of Task 1:** To map scenario-specific opportunities and threats by 2030  
- (6 min) To explain the task and select a second scenario to be discussed through the day (including the ‘least desirable’ one).  
- (9 min) To brainstorm on opportunities of the allocated scenario (for their organisation & national RTDI system).  
- (9 min) To brainstorm on threats of the allocated scenario (for their organisation & national RTDI system).  
- (9 min) To brainstorm on opportunities of the selected scenario (for their organisation & national RTDI system).  
- (9 min) To brainstorm on threats of the selected scenario (for their organisation & national RTDI system).  
- (9 min) From the pool of opportunities/threats for the actor/system (indistinctively) generated in the first part, each participant will assign 3 votes (in ORANGE) to the 3 most CERTAIN (few doubts around the issue) as well as IMPORTANT issues. These concepts could be object of immediate policy formulation/action.  
- (9 min) From the pool of opportunities/threats for the actor/system (indistinctively) generated in the first part, each participant will assign 3 votes (in GREEN) to the 3 most UNCERTAIN (many doubts around the issue, concept vagueness, more research is needed) as well as IMPORTANT issues. These concepts could be object of further foresight/research. |
| 11:15 - 13:00 (105 min) | **Objective of Task 2:** To map stakeholders strategies in the context of each scenario by 2030  
- (2 min) To explain the task.  
- (11 min) To brainstorm on **New/emerging strategies of the actor if scenario allocated happens**  
- (11 min) To brainstorm on **Re-emerging strategies of the actor if scenario** |
<table>
<thead>
<tr>
<th>14:00 - 15:00 (60 min)</th>
<th><strong>Objective of Task 3: To gather stakeholders’ assessment of ERA Objectives+ and get them tuned into ERA goals.</strong></th>
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<tr>
<td></td>
<td>• (5 min) To introduce the ERA objectives (informed by the ERA Progress Report 2013).</td>
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<td>• (15 min) To rate the importance of 15 ‘ERA objectives’. Rating (in ORANGE) will be done by asking participants about the most important three objectives (1 for the third one, 2 for the second one and 3 for the most important one)</td>
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<td>• (15 min) To brainstorm on ‘additional objectives’ (from their own perspective) (max. 5 objectives)</td>
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<tr>
<td></td>
<td>• (15 min) To rate the importance of ‘additional objectives’. Rating (in GREEN) will be done by asking participants about the most important two objectives (1 for the second one, 2 for the most important one)</td>
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<td>• (10 min) To openly discuss in plenary about groups’ ratings.</td>
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<td>15:00 -15:45 (45 min) + (30 min see below)</td>
<td><strong>Objective of Task 4: To map stakeholders’ strategies against ERA Objectives+</strong></td>
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<td>• (5 min) To explain the tasks.</td>
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<td>• (30 min) To map the task 2 strategies against the 15 ERA Objectives+ sections in terms of their positive/negative ‘impact’.</td>
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<td>• (15 min) To brainstorm (following scenarios colour coding: [Y] [B] [P] [G]) on additional strategies to fill any potential gaps.</td>
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</table>

**NOTE 1**: Brainstormed strategies will be posted in individual post-its of 4 different colours:
- For Scenario 1 [YELLOW] ; for Scenario 2 [BLUE]; for Scenario 3 [PINK] ; for Scenario 4 [GREEN]

**NOTE 2**: Please make sure you write ‘N’, ‘R’, ‘D’, or ‘C’, as well as your group number, in the top-right corner of the post-it to be able to keep track of its location (because we will remove the task 2 post its from the magic chart during the next tasks).

| 60 min | Lunch break |
- (15 min) To **brainstorm**, using ORANGE post-its, additional strategies that are not compatible with VERA scenarios.
- (10 min) To **discuss** results in the plenary.

**NOTE 1:** Not all the strategies generated in task 2 have to be moved to task 4. If a strategy does not fit with any ERA objectives+, it will remain in the task 2 board.

| 15 min | Coffee break |
| 16:00-16:30 (30 min) | Objective of Task 4: Continuation |
| 16:30-17:00 (30 min) | Objective of Task 5: To identify short-term actions vis-à-vis ERA Objectives+
- (30 min) To **conduct** a plenary semi-structured discussion will help to elicit actions from discussants about what kind of actions they would take today and how these actions relate with the ERA objectives+.
| 17:00-17:15 | Q&A and conclusions |
### 10.4.3. ERA dimensions and ERA aspects

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<tr>
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<th><strong>Boost research and innovation synergies</strong></th>
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<td>Shortening the transition from invention to innovation</td>
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<td>1.4</td>
<td>Using IP supporting strategies for innovation</td>
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<td>1.5</td>
<td>Boosting industry-academia R&amp;I cooperation</td>
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<td>1.6</td>
<td>Embracing open innovation strategies</td>
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<td>1.7</td>
<td>Stimulating entrepreneurship</td>
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<th><strong>Strengthen the global influence of ERA</strong></th>
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<td>2.2</td>
<td>Intensifying dialogues with emerging and developing economies</td>
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<td>2.3</td>
<td>Optimising research infrastructures funding and access</td>
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<th><strong>Promote smart R&amp;I evaluation</strong></th>
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<td>3.1</td>
<td>Reinforcing the role of evidence and transparency in R&amp;I policies</td>
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<td>3.2</td>
<td>Assessing R&amp;I impacts more flexibly and comprehensively</td>
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<td>3.3</td>
<td>Promoting peer review in excellence and relevance evaluation</td>
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<td>Evaluating and monitoring citizen-science initiatives more responsibly</td>
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<th><strong>Improve the governance of the EU R&amp;I system</strong></th>
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<td>4.1</td>
<td>Exploring synergies between R&amp;I and other funding programmes at EU level</td>
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<td>4.4</td>
<td>Supporting R&amp;I stakeholders' dialogues</td>
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<td>Reducing and simplifying EU R&amp;I bureaucracy</td>
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<td>Sustaining research and innovation funding</td>
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<td>4.7</td>
<td>Setting R&amp;I agendas collaboratively</td>
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<td>Engaging society in science and R&amp;I policy decisions</td>
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<td>5.3</td>
<td>Elaborating R&amp;I oriented education and social awareness strategies</td>
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<td>Enabling impactful exchange of researchers between academia and industry</td>
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<td>Achieving an open and cohesive labour market</td>
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<td>Harmonising careers and training programmes</td>
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<td>Standardising and utilising digital research platforms</td>
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<th><strong>Achieve gender equality and social inclusion in R&amp;I</strong></th>
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<td>8.1</td>
<td>Putting in place and implementing appropriate gender equality measures</td>
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<td>Involving disable and vulnerable groups in R&amp;I</td>
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<td>8.3</td>
<td>Including multicultural perspectives in R&amp;I programmes</td>
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<th><strong>Reinforce ERA regional outreach and inclusion</strong></th>
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<td>9.1</td>
<td>Accelerating regional cohesion through R&amp;I</td>
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<td>Strengthening the role of regions in ERA</td>
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<td>9.3</td>
<td>Increasing interregional R&amp;I cooperation</td>
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10.4.4. Summary of the insights generated in VERA

Number of insights by perspectives (dimensions), focus groups and scenarios

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<td>73</td>
<td>30</td>
<td>2.43</td>
<td>3%</td>
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<td>2</td>
<td></td>
<td></td>
<td></td>
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<td>2%</td>
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<td></td>
<td>1</td>
<td>3</td>
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<td>Gend</td>
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<td>1</td>
<td>1</td>
<td>3</td>
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<td>34</td>
<td>2.56</td>
<td>3%</td>
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<td>100%</td>
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</tr>
</tbody>
</table>
10.4.5. ERA Open advice bundles: Horizon 2020 lens

A) ERA policy bundle on Excellent Science (as extracted from ‘ERA Open advice”)

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).

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
- 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
- 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
- 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
- Encourage MS to open up their national and regional research funding programmes at global level

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; 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
- 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
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
- Elaborate education and communication platforms that enable citizens to access relevant scientific knowledge and share qualified opinions on the value of excellent science

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.
B) ERA policy bundle on **Industrial leadership** (as extracted from ‘ERA Open advice’)

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.

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
- Create financial instruments and incentives to make global R&I collaboration easier for European SMEs, and to attract other SMEs to Europe
- Improve the financial support for the researchers’ cross-sectoral mobility transition costs
- 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

*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
- Support disruptive and transformative innovation by developing new regulatory frameworks that focus on solutions needed rather than on the processes to achieve them
- Intensify R&I regional efforts on those emerging areas where regions have strong capabilities

*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
- Develop platforms (institutions and networks) as well as mechanisms and tools (communication channels and interfaces) capable of supporting truly participatory RRI processes

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).
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.

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
- 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
- Create favourable conditions in Europe for R&I to draw on the insights stemming from different cultures and societies
- Broaden the spectrum of disciplines that directly participate in grand challenges research, especially social sciences and humanities

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
- 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
- Promote international cooperation through more open mechanisms, e.g. by enlarging Joint Programming Initiatives to non-EU countries based on international variable geometry

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
- Promote a gradual shifting in the promotion of researchers towards taking more account of impact and relevance of research alongside quality as traditionally understood

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).
### 10.4.6. Example of VERA soundness assessment typology

<table>
<thead>
<tr>
<th>VERA ‘Excellence’ bundle soundness assessment</th>
<th>Necessity</th>
<th>Sufficiency</th>
<th>Feasibility</th>
<th>Collateral effect</th>
<th>TYPE OF ADVICE ACCORDING TO SOUNDNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Set up multidisciplinary communities and structures where researchers can develop bottom-up initiatives, thus complementing those directions marked by grand challenges</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>INSUFFICIENT (MORE ACTIONS ARE NEEDED)</td>
</tr>
<tr>
<td>B. 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</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>INSUFFICIENT (MORE ACTIONS ARE NEEDED)</td>
</tr>
<tr>
<td>C. Take on some of the R&amp;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</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>UNFEASIBLE (MORE RESOURCES ARE NEEDED)</td>
</tr>
<tr>
<td>D. Promote the evaluation of R&amp;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</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>INSUFFICIENT (MORE ACTIONS ARE NEEDED)</td>
</tr>
<tr>
<td>E. Encourage MS to open up their national and regional research funding programmes at global level</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>EVENTUAL DILEMMA WHEN MORE RESOURCES WILL BE ADDED</td>
</tr>
<tr>
<td>F. Promote a mix of goal oriented (application-driven) and knowledge oriented (curiosity-driven) funding to guarantee the sustainability of fundamental research</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>MORE DELIBERATION ON ALTERNATIVES AND ACTIONS ARE NEEDED</td>
</tr>
<tr>
<td>G. 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</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>SOUND ADVICE</td>
</tr>
<tr>
<td>H. Orientate regional specialisation efforts towards a better utilisation of existing regional R&amp;I infrastructure and knowledge base</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>INSUFFICIENT (MORE ACTIONS ARE NEEDED)</td>
</tr>
<tr>
<td>I. Elaborate education and communication platforms that enable citizens to access relevant scientific knowledge and share qualified opinions on the value of excellent science</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>SOUND ADVICE</td>
</tr>
<tr>
<td>VERA ‘Industrial leadership’ bundle soundness assessment</td>
<td>Necessity</td>
<td>Sufficiency</td>
<td>Feasibility</td>
<td>Collateral effect</td>
<td>TYPE OF ADVICE ACCORDING TO SOUNDNESS</td>
</tr>
<tr>
<td>---------------------------------------------------------</td>
<td>-----------</td>
<td>-------------</td>
<td>-------------</td>
<td>-------------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>A Promote the evaluation of excellence, through peer review or self-evaluation, in order to enhance international R&amp;I competitiveness, and as a driver for the modernisation of the R&amp;I system</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>MORE ACTIONS AND RESOURCES ARE NEEDED</td>
</tr>
<tr>
<td>B Create financial instruments and incentives to make global R&amp;I collaboration easier for European SMEs, and to attract other SMEs to Europe</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>SOUND ADVICE</td>
</tr>
<tr>
<td>C Improve the financial support for the researchers’ cross-sectoral mobility transition costs</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>MORE ACTIONS AND RESOURCES ARE NEEDED</td>
</tr>
<tr>
<td>D 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</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>INSUFFICIENT (MORE ACTIONS ARE NEEDED)</td>
</tr>
<tr>
<td>E Promote the use of roadmaps and other technological intelligence tools to realise the potential of EU industries</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>SOUND ADVICE</td>
</tr>
<tr>
<td>F Support disruptive and transformative innovation by developing new regulatory frameworks that focus on solutions needed rather than on the processes to achieve them</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>SOUND ADVICE</td>
</tr>
<tr>
<td>G Intensify R&amp;I regional efforts on those emerging areas where regions have strong capabilities</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>SOUND ADVICE</td>
</tr>
<tr>
<td>H Create gender equality measures that recognise the relevance of equality for R&amp;I industry strategies, especially in SMEs</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>INSUFFICIENT (MORE ACTIONS ARE NEEDED)</td>
</tr>
<tr>
<td>I Develop platforms (institutions and networks) as well as mechanisms and tools (communication channels and interfaces) capable of supporting truly participatory RRI processes</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>UNFEASIBLE (MORE RESOURCES ARE NEEDED)</td>
</tr>
<tr>
<td><strong>VERA ‘Societal challenges’ bundle soundness assessment</strong></td>
<td>Necessity</td>
<td>Sufficiency</td>
<td>Feasibility</td>
<td>Collateral effect</td>
<td><strong>TYPE OF ADVICE ACCORDING TO SOUNDNESS</strong></td>
</tr>
<tr>
<td>----------------------------------------------------------</td>
<td>-----------</td>
<td>-------------</td>
<td>-------------</td>
<td>------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>A Promote future-oriented and multi-stakeholder participatory processes that facilitate the bottom-up definition of common long-term challenges and research agendas</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>INSUFFICIENT (MORE ACTIONS ARE NEEDED)</td>
</tr>
<tr>
<td>B 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</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>MORE ACTIONS AND RESOURCES ARE NEEDED</td>
</tr>
<tr>
<td>C Create favourable conditions in Europe for R&amp;I to draw on the insights stemming from different cultures and societies</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>EVENTUAL DILEMMA WHEN MORE RESOURCES WILL BE ADDED</td>
</tr>
<tr>
<td>D Broaden the spectrum of disciplines that directly participate in grand challenges research, especially social sciences and humanities</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>INSUFFICIENT (MORE ACTIONS ARE NEEDED)</td>
</tr>
<tr>
<td>E Make systematic use of horizon scanning to identify emerging innovation opportunities worldwide and support their piloting, implementation and scaling-up across MS</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>MORE ACTIONS AND RESOURCES ARE NEEDED</td>
</tr>
<tr>
<td>F 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</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>SOUND ADVICE</td>
</tr>
<tr>
<td>G Promote international cooperation through more open mechanisms, e.g. by enlarging Joint Programming Initiatives to non-EU countries based on international variable geometry</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>EVENTUAL DILEMMA WHEN MORE RESOURCES WILL BE ADDED</td>
</tr>
<tr>
<td>H Open research evaluation to other areas and DGs with R&amp;I competences</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>MORE ACTIONS AND RESOURCES ARE NEEDED</td>
</tr>
<tr>
<td>I Promote a gradual shifting in the promotion of researchers towards taking more account of impact and relevance of research alongside quality as traditionally understood</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>DILEMMA</td>
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</tbody>
</table>
10.5. ADVICE TYPOLOGIES

10.5.1. A typology of recommendations based on the level of soundness

<table>
<thead>
<tr>
<th>Necessity</th>
<th>Sufficiency</th>
<th>Feasibility</th>
<th>No collateral effects</th>
<th>Type of recommendations according to the components of soundness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Sound advice</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Unnecessary advice</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>Insufficient advice</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>Unfeasible advice</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Dilemma</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>The advice demands more actions and the utilisation of more resources</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>More deliberation on better alternatives is needed and more resources are required</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>More deliberation is requested to better check the possible alternatives and to counteract collateral effects</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>More deliberation is needed on better alternatives and more actions are required to solve the problem</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>A potential dilemma may arise as soon as feasibility (more resources) will be ensured</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>A potential dilemma may emerge as soon as other accompanying actions will be implemented</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Insufficient advice, potentially becoming a dilemma as soon as more resources will be added</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>There are other existing alternatives and, in addition, the advice is unfeasible and counterproductive</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>Although the advice will not bring side effects, it is not able to solve the problem, and it is unfeasible</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>Unfocused and counterproductive advice, although implementable</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Unsound advice</td>
</tr>
</tbody>
</table>

(+) QUALITY OF ADVICE (-)
10.5.2. A typology of recommendations based on the implementation character

<table>
<thead>
<tr>
<th>Action character</th>
<th>Reference</th>
<th>Type of action</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
<td>Present</td>
<td>Emerging</td>
<td>To implement actions never done by the actor in the past</td>
</tr>
<tr>
<td></td>
<td>Past</td>
<td>Recovering</td>
<td>To implement actions that the actor had already implemented in the past</td>
</tr>
<tr>
<td>Conservative</td>
<td>Up</td>
<td>Reinforcing</td>
<td>To enhance ongoing actions</td>
</tr>
<tr>
<td></td>
<td>Equal</td>
<td>Maintaining</td>
<td>To continue/ maintain ongoing actions, i.e. business as usual</td>
</tr>
<tr>
<td></td>
<td>Down</td>
<td>Decreasing</td>
<td>To reduce the intensity of ongoing actions</td>
</tr>
<tr>
<td>Concluding</td>
<td>Latency</td>
<td>Freezing</td>
<td>To paralyse ongoing actions for some time</td>
</tr>
<tr>
<td></td>
<td>End</td>
<td>Ceasing</td>
<td>To cease ongoing actions</td>
</tr>
<tr>
<td>Combining</td>
<td>Internal</td>
<td>Merging</td>
<td>To combine ongoing actions</td>
</tr>
<tr>
<td></td>
<td>External</td>
<td>Adding</td>
<td>To add and combine new initiatives with ongoing actions</td>
</tr>
</tbody>
</table>
### 10.5.3. A typology of recommendations based on the policy target

<table>
<thead>
<tr>
<th>Type of policy</th>
<th>Type of innovation measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measures for improving policy mechanisms</td>
<td>Agenda-setting mechanisms and procedures&lt;br&gt;Policy formulation improvements&lt;br&gt;Policy implementation measures&lt;br&gt;Policy monitoring &amp; evaluation improvements</td>
</tr>
<tr>
<td>Measures for improving innovation from a supply-side perspective</td>
<td>Institutional support of public research institutes&lt;br&gt;Financial incentives: support programmes/ tax exemptions&lt;br&gt;Research funding criteria definition&lt;br&gt;Infrastructure creation and adjustments&lt;br&gt;Measures to increase competition and technology transfer: international cooperation, networks, alliances promotion&lt;br&gt;Measures to increase knowledge transfer: new actors, networks, academic alliances, information access, internationalisation&lt;br&gt;Education and formation&lt;br&gt;Innovation management: organisational adjustments, capacity building&lt;br&gt;Awareness building and scientific consultancy: strategic intelligence, scientific advice for research</td>
</tr>
<tr>
<td>Measures for improving innovation from a demand-side perspective</td>
<td>Regulation: IPR, labour, competition policy and admin. Framework&lt;br&gt;Creation of or supporting the creation of companies&lt;br&gt;Public procurement and public leading innovation uses&lt;br&gt;Support of private demand: catalytic procurement, demand subsides&lt;br&gt;Enable / Marketing: training, awareness measures&lt;br&gt;Regulation: norms for production, performance, usage&lt;br&gt;Demand construction and articulation initiatives&lt;br&gt;Strategic intelligence for private &amp; public demand&lt;br&gt;Combination of demand measures &amp; supply/demand</td>
</tr>
<tr>
<td>STI agenda setting</td>
<td>STI priority areas to invest and reinforce&lt;br&gt;R&amp;I priority areas: further research, support and funding (research agenda setting)</td>
</tr>
</tbody>
</table>

10.6. THEMES DISCUSSED IN THE INTERVIEWS

1. General reflections on fully-fledged foresight
2. Influencing factors in foresight recommending processes
3. Contribution of future anticipation with recommending processes

<table>
<thead>
<tr>
<th>Themes discussed in the interviews</th>
<th>1</th>
<th>2</th>
<th>3</th>
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</thead>
<tbody>
<tr>
<td>Advantages and disadvantages of highly participatory intelligence processes in comparison with more reduced experts’ advisory panels</td>
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<tr>
<td>Opinion on foresight processes as a source of R&amp;I policy advice</td>
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<tr>
<td>Other more reliable and consistent methods (qualitative/quantitative) than foresight to generate policy advice</td>
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<td>Suggestions for improving the practice of foresight practice with regards to its capacity to generate policy advice</td>
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<tr>
<td>Policy makers’ contribution to improving the foresight advising process</td>
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<tr>
<td>Characteristics that any R&amp;I policy advice should have and their implications on the design of the foresight process</td>
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<tr>
<td>Influence of future scenarios on the characteristics of the recommendations</td>
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<td>Capacity of scenarios to eventually stimulate the generation of recommendations</td>
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<tr>
<td>Influence of the level of transformation of scenarios (distance/differences with respect the present) on recommendations characteristics</td>
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<tr>
<td>Influence of participants’ representation in the characteristics of the final recommendations. Relevance in comparison to the influence of scenarios</td>
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<tr>
<td>Effects of the final fleshing-out process on the characteristics of the final recommendations</td>
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<tr>
<td>Possible effects of argumentation on the subjectivity of advice. How to distinguish between neutral/group-based advice and interested agendas</td>
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<tr>
<td>Methods or systematic procedures to assess the neutrality and reliability of policy advice, i.e. foresight advice quality evaluation</td>
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<tr>
<td>Using soundness, references to collateral consequences, and feasibility activities to support recommendations</td>
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<td>Delivery of alternative actions (set of choices) in contrast to single advice</td>
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<td>Delivery of policy advice as customised bundles of recommendations</td>
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<tr>
<td>Volume of recommendations generated in parallel (with independence) to future scenarios</td>
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<tr>
<td>Importance and usefulness of scenarios in policy advice. Reliability of scenario-based advising processes</td>
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