

Foresight in Support of Designing Mission-oriented R&I Programmes

The case of FP 9

Matthias Weber (AIT Austrian Institute of Technology, Vienna)

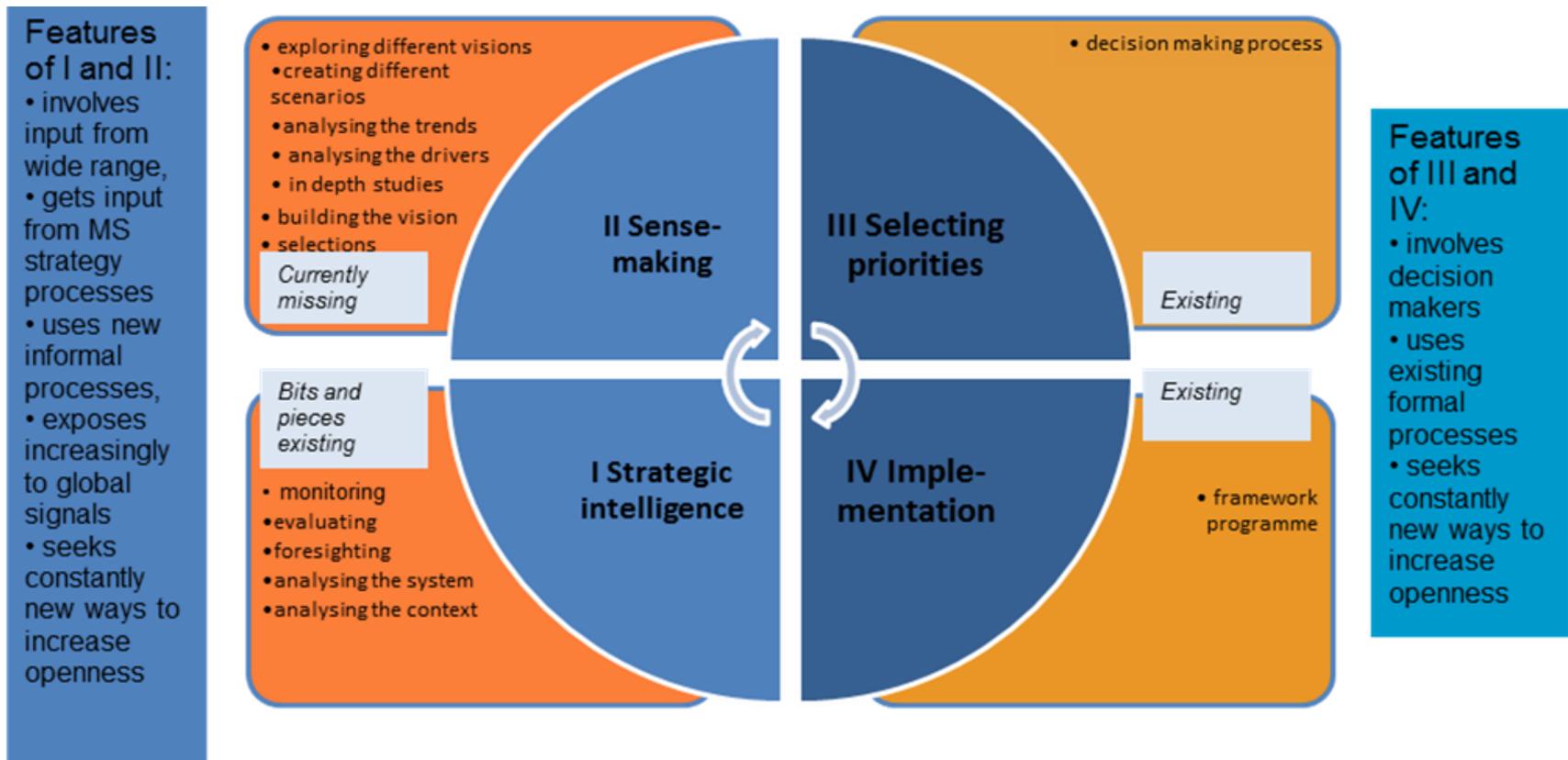
Eu-SPRI Conference 2018

Paris, 6-8 June 2018

Background

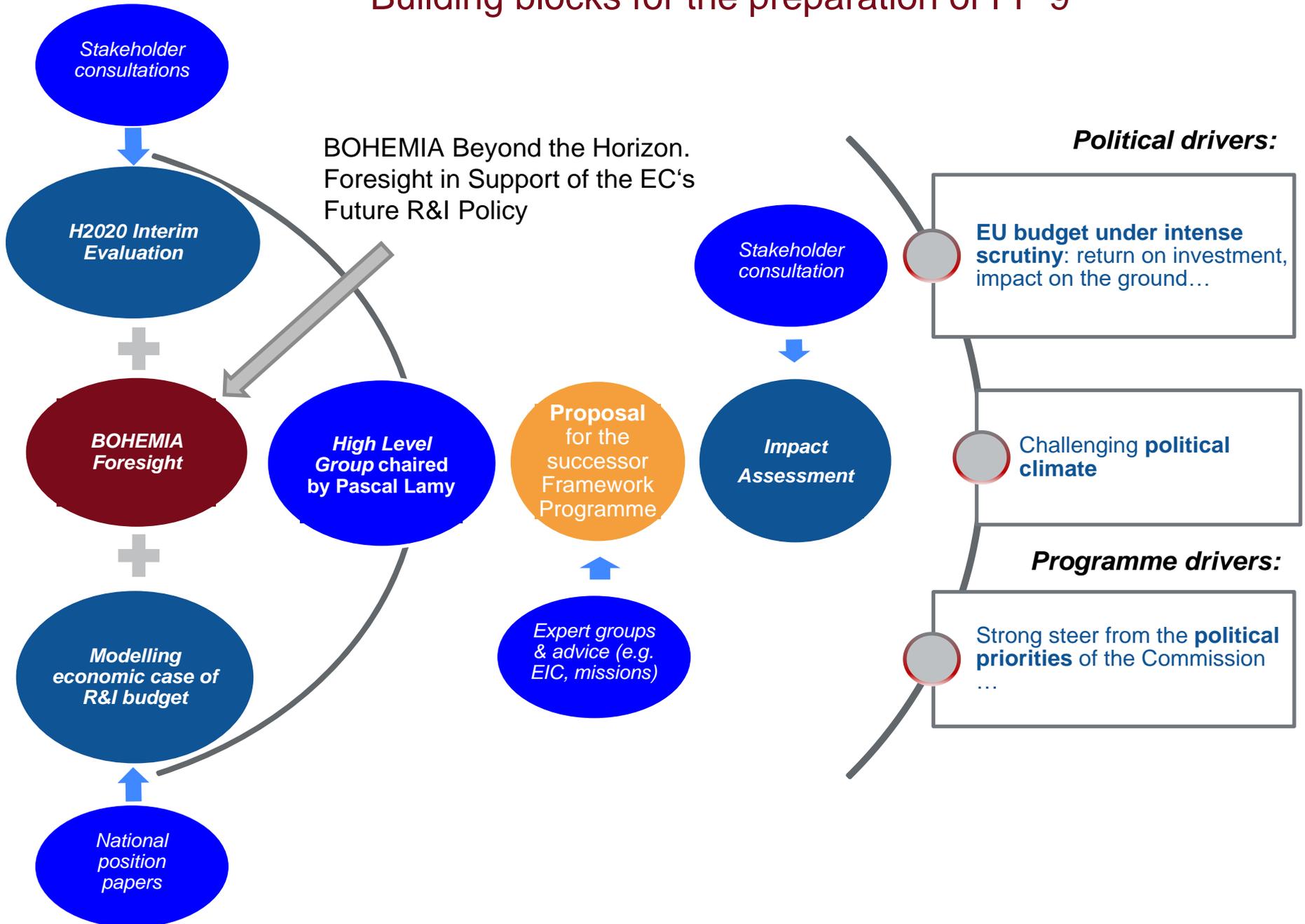
- Strategic or normative turn in R&I policy: Moving towards transformative policies for tackling global and societal challenges
 - Beyond research and innovation: more attention to changes in production and consumption, and to social and organisational change
 - Forward-looking and future-oriented thinking in government
 - Mobilisation of actors and stakeholders to transform ecosystems through experimentation and scaling/diffusion
 - Better policy alignment between R&I and sectoral/demand-side policies
- How to shape more coherent transformative policies at European level?
- How to develop a more „transformative“ FP 9, and set informed priorities accordingly? Go beyond H2020?
- The role of foresight in early phase of programme design, which has been a ‚blackbox‘ so far
- First time that foresight has been used explicitly to underpin the development of an FP

EC R&I policy cycle



Source: EFFLA 2011

Building blocks for the preparation of FP 9



Research interest

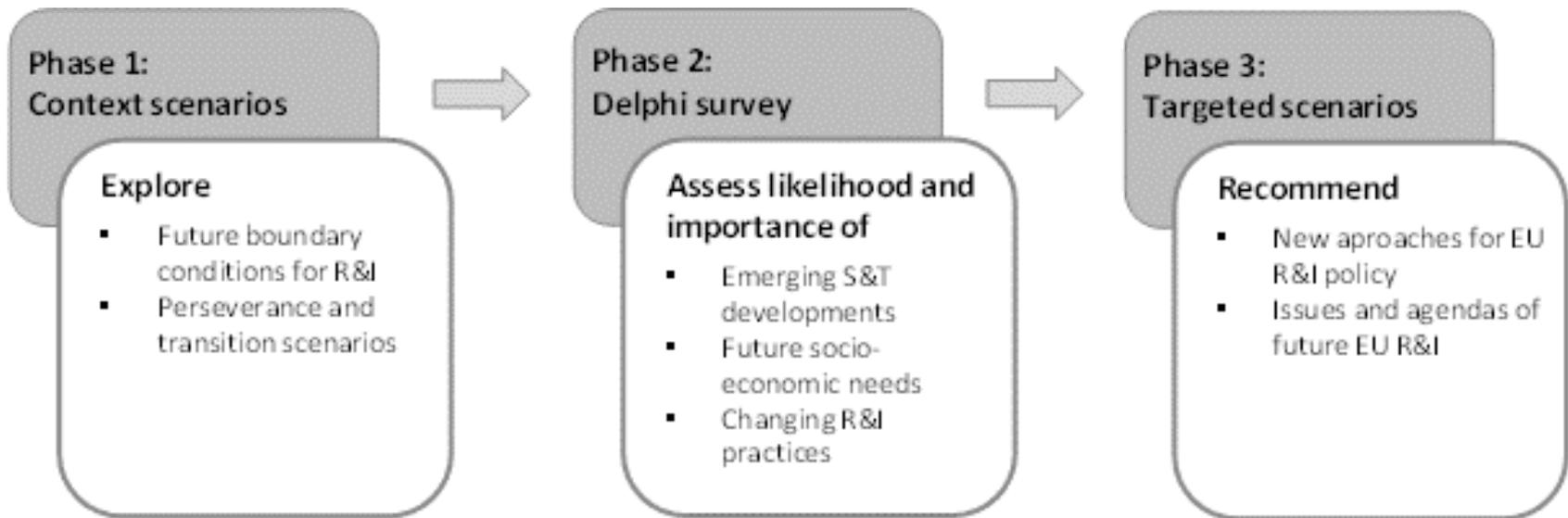
- Moving towards more transformative and future oriented R&I programmes
 - Develop and pilot a foresight methodology to help underpin a transformative R&I programme („product benefits“: outputs, priorities)
 - Organisational model to embed such an R&I programme into a government organisation and facilitate/prepare for enhanced policy coordination („process/organisational benefits“: organisational capacity, organisational change)

Towards a new rationale for FP 9?

- The guiding rationale in a nutshell
 - Research results of FP have an impact in society ~5-10 years after its completion
 - Major global and societal challenges at the time horizon ~2035 as starting point
 - Emerging developments in science, technology, innovation and society (STIS) as opportunities to tackle these challenges
 - Taking into account openness and variability of future contexts
- Strategic foresight to underpin the proposal for FP9
 - Explore possible alternative futures in terms of societal, economic and political conditions and boundaries for EU R&I policy
 - Assess possible future evolution of socio-economic as well as of scientific and technological challenges, needs and opportunities
 - Recommend potential priority areas and policy approaches for addressing them

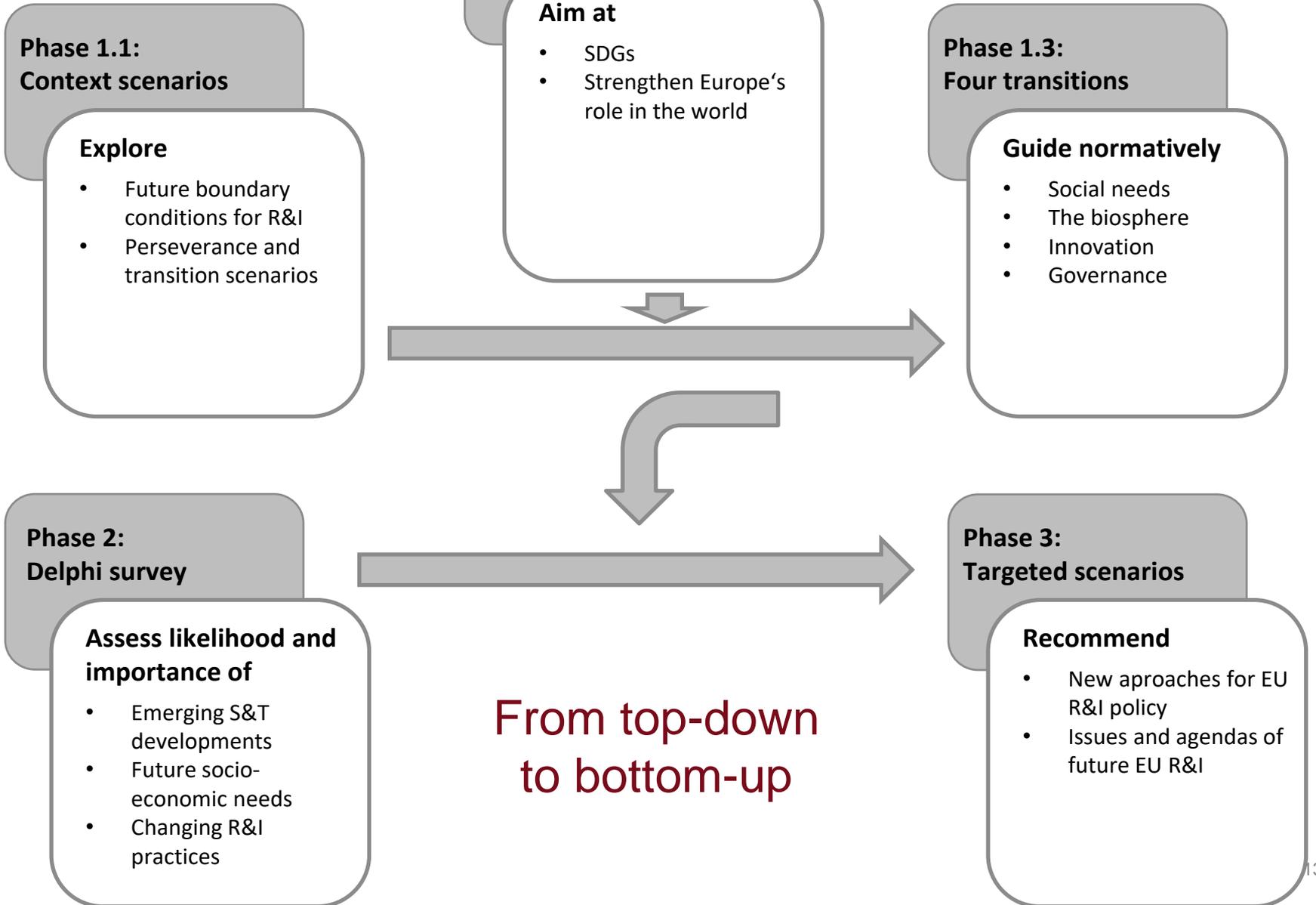
On methodology

Foresight in support of FP 9 – a straightforward approach?



In the very end, not as straightforward as it seemed at first glance!

With hindsight...



On embedding

Foresight to improve coherence of (transformative) policies

- How to achieve mobilizing and ‘coordinating’ effect within the organization?
 - Important for coherence of policy mixes across policy areas
- Networks matter for making foresight effective!
 - Extra-organizational networks → well known!
 - Intra-organizational networks → less well understood!
- Hypotheses on the intra-organizational role of foresight for shaping transition policies
 - Well designed foresight processes can support the (soft) coordination between R&I and sectoral policies,
 - This alignment can be useful for both for instrumental (i.e. programme development) as well as for strategic purposes. (i.e. mobilizing ecosystems),
 - The mechanisms through which a foresight process can achieve these effects operate at individual/cognitive and at organizational levels

Theoretical underpinnings

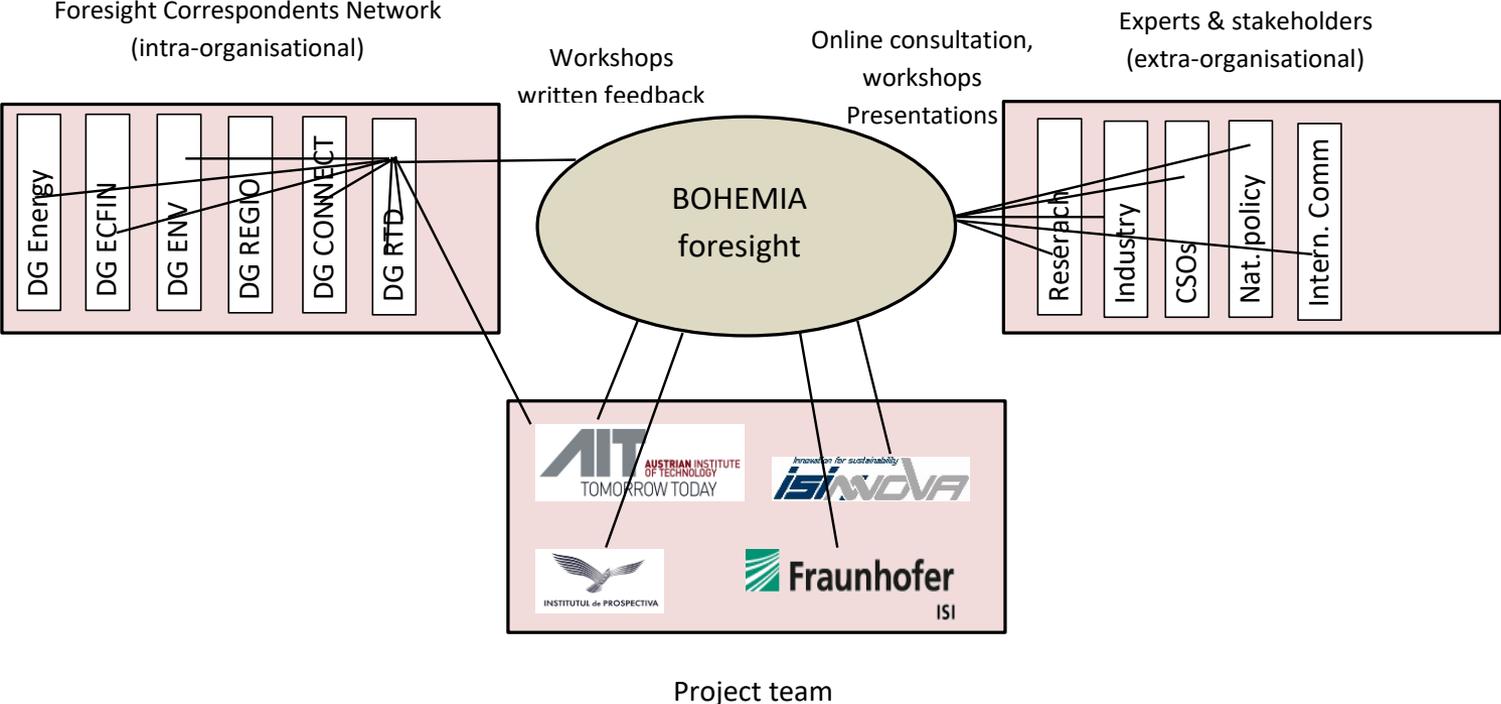
- Different types of foresight and their impacts
 - Instrumental vs. systemic
- Policy learning and policy change
 - 3.5 levels of learning
- Impact of foresight on groups and organisations
 - Mobilising intra- and extra-organisational networks
- Embedding of foresight in policy-making cycle
 - Flexible activation of networks

→ No surprise transition thinking hits barriers in government bodies!

What does this mean for the design of foresight?

- Triangle of intra- and extra-organisational networks and project team
- Intra-organisational networks, cutting across policy areas
 - Provide inputs on R&I as well as non-R&I policy requirements
 - Help create ownership and overcome barriers to policy alignment and coherence
- Extra-organisational networks
 - Expert and stakeholder interaction
 - Create a space of exchange with experts, stakeholders and the public early on in the policy-making process
- Project team
 - Provides substantive inputs
 - Integrates knowledge
 - Moderates the overall process
- Intra- and extra-organisational networks can mutually reinforce each other in terms of improving quality, relevance and acceptance of foresight results and outcomes

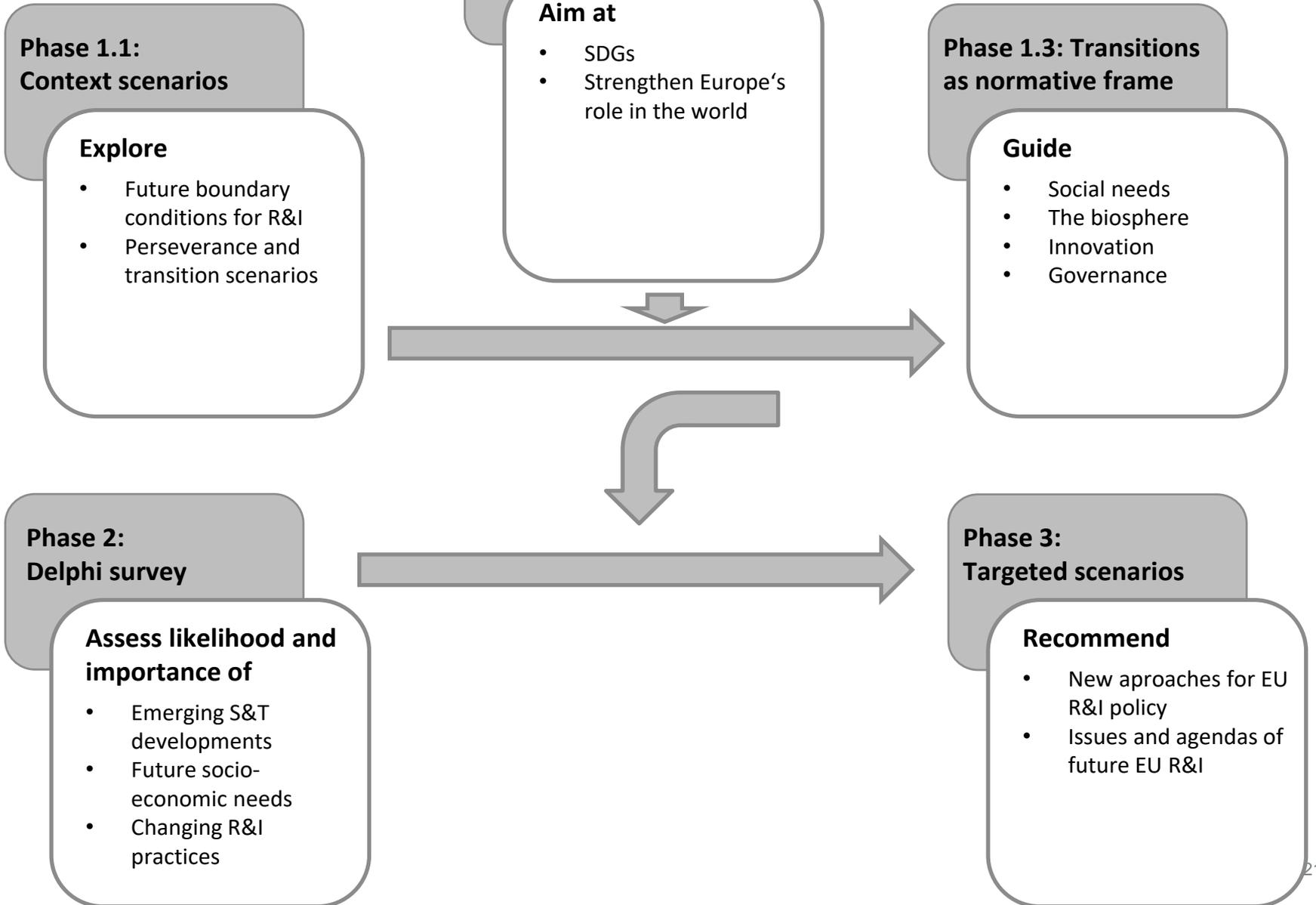
Interplay of intra- and extra-organisational networks



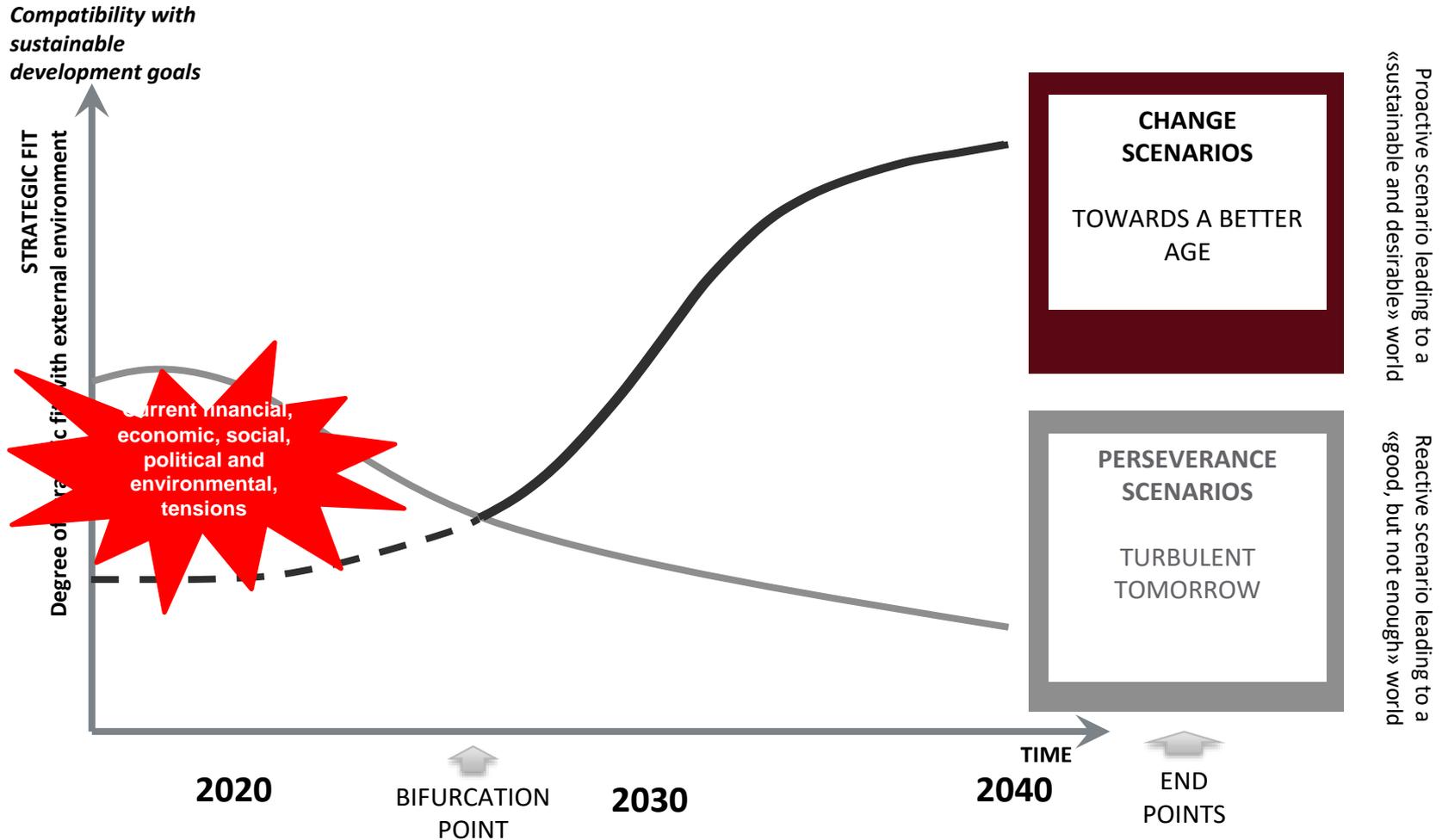
On outputs and outcomes

From top-down....

With hindsight...



Change vs. perseverance scenarios



Quelle: Ricci et al. 2017

Contrasting scenarios of global and European scope

Two types of scenarios to illustrate possible future paths:

- **‘Perseverance Scenarios’**: current structures and institutions persevere, leading to a continuation of current cleavages
- **‘Change Scenarios’**: Europe spearheads a structural change to 'the future we want'

Key areas	Change scenarios	Perseverance scenarios
Climate change	Low carbon transition	Climate calamity
Environment and ecosystems resources and services	Towards a new well-being	The age of over-exploitation
Health	Towards health for all	Health divide
Security and Resilience	Building societal security	Security race
Accelerating innovation	The innovation revolution for everyone	Losing the race against the machine
Towards a world of cities	Urban bloom	Urban jam
Global political and economic context	Transforming our world for the better	Turbulent transitions

Context scenarios: so what?

- Context scenarios tell us about the spectrum of future possibilities, but without normative reference points, they are of limited use
 - How to obtain such a normative reference point?
- Context scenarios triggered debate within FCN about the question what ambition and purpose the next FP should actually pursue

What are Europe's (the EC's) ambitions with regard to the next FP?

- Two sets of ambitions behind FP 9:
 - to maintain or even strengthen Europe's global political and economic role
 - to contribute to achieving the Sustainable Development Goals (SDGs)
- R&I has an important role to play in meeting these ambitions
 - but taken alone it will not be sufficient to reach the ambitions
- R&I must be part of a more comprehensive policy agenda and strategy
 - for addressing major future challenges Europe is likely to face in the future

- ➡ Moving the FP out of its isolated ‚comfort zone‘
- ➡ More demanding and transformative ambitions associated with FP 9
- ➡ Change scenarios („Transitions“) are needed to meet the two ambitions jointly

Co-creating four transitions as orientating frame for future R&I policy



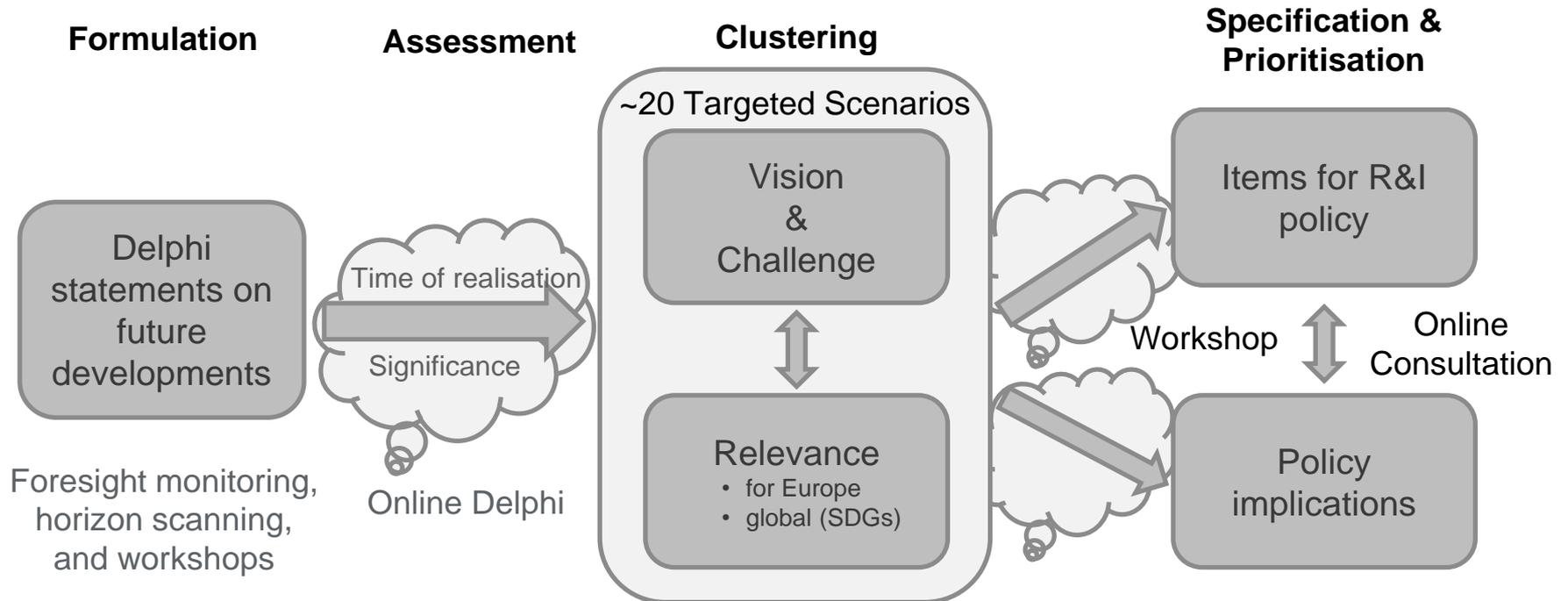
Candidate priority areas („missions“) need to contribute to these transitions

On outputs and outcomes

To bottom-up....

Exploring „candidate“ missions („targeted scenarios“) within the normative framework of the four transitions

- Complementary to the four transitions as normative frame, the Delphi survey, exploratory workshops and online consultation focus on emerging developments in science and technology, socio-economic needs and R&I practices



Format of Targeted Scenarios

- Vision/targeted scenario at 2040
- Assessment of relevance for Europe and the four transitions
 - Why is it important for strengthening Europe's global position?
 - Why does it help tackle SDGs?
- Implications for EU policy
 - What other policy areas are affected
- Items and priorities for an R&I agenda
 - Directions for an R&I agenda (understanding-oriented research, solutions-oriented research, regulatory science/policy knowledge, scaling up/social innovation)
 - 8-10 priority R&I items from the online consultation
 - 1-3 top priorities per targeted scenario

Structure of Targeted Scenario narratives

Title

Material resource efficiency

Summary

Summary

It is 2040. Sustainable consumption patterns, truly circular production-consumption networks, and shifts to less harmful, often renewable resources have made Europe less dependent on natural resources, more self-sufficient and more competitive in its industries. In addition, environmental degradation has been reversed.

Scenario

Scenario

It is 2040. The European economy is less dependent on natural resources and more self-sufficient than anytime since the beginning of the century. There have been shifts to less material-intensive consumption patterns, to the closing of material loops through re-use and recycling, to the substitution of material resources by less harmful, often renewable ones, and to environmentally benign resource extraction methods.

Circular economy principles are applied across all systems of production and consumption, from agro-food to electronic goods. Consumer preferences have shifted towards services and products with longer life-time, prompting changes in product and service design (e.g. modular design, design for recycling, etc.), but also in business models (e.g. shift to services, sharing).

The use of rare earths has been reduced by 80% compared to 2016 figures. After having met the targets of the EU circular economy package of 2016, progress slowed down as physical and organizational barriers became more challenging to resolve. The target of recycling more than 90% of all waste physically or energetically has yet to be achieved. Recovered metals from landfills (e.g. aluminium, iron, copper, silver, gold,) contribute substantially to supply, but still provide less than 50% of the EU's demand.

Materials' substitution has implications throughout the entire production process and requires significant investments. Not all candidate materials fulfil initial expectations, for technological and economic reasons as well as for concerns about unexpected health risks. Renewable materials and the bio-economy play a more significant role, for the less harmful environmental effects associated with their use and their contribution to reducing dependency on non-European sources. Their significant economic promise has been used sustainably, managing the environmental consequences of their extraction and use.

Improved extraction and processing methods for all natural resources and environmental remediation techniques (including local geo-engineering) have enabled improvements in the European environment. Combining mining with the deposition of carbon-rich minerals offsets the damage caused by the extraction against climate related benefits. Deep sea mining was seen as a promising option in the times of increasing needs for "rare earths". However, it never quite took off, as it was tangled with environmental concerns and legal issues regarding the right to exploit offshore deep-sea resources, liabilities for environmental damages and the settling of international disputes. In the meantime, substitutability and the circular economy have alleviated the upward pressure in the prices of rare materials.

Relevance for Europe

Relevance for Europe

Dependence on critical materials is a strategic issue, especially when these materials play key roles in important infrastructures, such as defence equipment.

The environmental damage caused by material extraction and by waste management is an important concern in Europe, as well as globally. By making more out of scarce natural resources, environmental damage is kept within the limits of planetary boundaries.

By strengthening R&I, Europe has the opportunity to play a leading role globally in the provision of solutions for efficient resource use. And so much so that Europe is home to a world-leading environmental services industry, which is set to expand massively into resource management roles in industrial value chains.

Contribution towards the SDGs

Finding alternative solutions to the use of scarce and critical natural resources is core to the achievement of the Sustainable Development Goals No. 12 on Responsible Consumption and Production and No. 3 on Good Health and Wellbeing, but also relevant to all other environment-related goals addressing water supply (6), energy (7), sustainable cities (11), climate action (13), life below water (14) and life on land (15).

Implications for EU policy

There are a number of EU policies that need to progress in synch to promote a more self-sufficient circular economy. Agriculture, Environment, Trade, Industry, Research and Innovation are at the core. Also external policies need to address the strategic implications for countries on which Europe depends for the supply of critical materials and resources.

As an overarching principle, the internalisation of environmental and social costs would provide a strong economic lever and incentive optimising resource efficiency in production and consumption.

More specifically, environmental regulation is an important demand-side driver of change towards realising extensive re-use and re-cycling, as are labour regulations when it comes to improving working conditions in resource-extracting and processing industries.

Future Directions for EU R&I policy

- Environmental impact assessment
- Solutions for more efficient and sustainable use of materials in products over the entire life cycle
- More cost-efficient technologies for extraction of valuable materials from waste
- Circular industrial systems design
- Behavioural changes on the supply and demand side in response to incentives
- "No-waste" policies. Everything has to be brought back without loss of quality.
- Science-based approach to regulatory and policy decision-making
- Eco-efficient materials
- Use of solar energy for generation of electricity and storage to chemical energy
- New substitutes for rare materials
- Research focusing on renewable materials and their split up/recycling in early development process

Relevance for SDGs

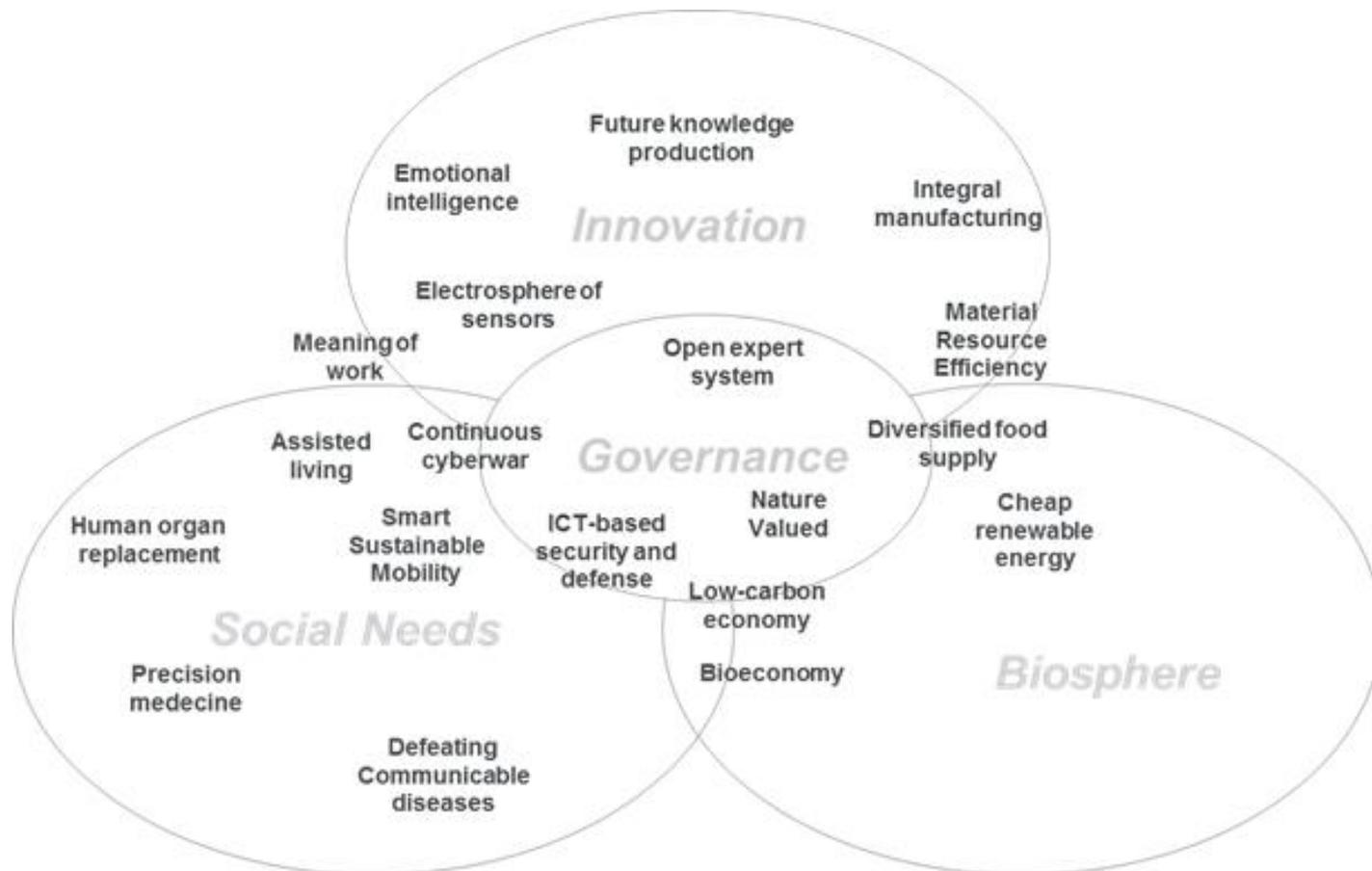
Implications for EU policy

Future R&I directions

These narratives will be „travelling“ within the European institutions

Targeted scenarios as contributions to the realisation of the four transitions

- Most targeted scenarios contribute to more than one transition



Analysis: Cross-cutting observations

- Targeted scenarios are quite diverse in terms of granularity and scope
 - Some address systemic challenges, others are more focused on technology
 - Not necessarily tied to clear targets
- Targeted scenarios provide a different way of framing future policy challenges, with implications for the formulation of
 - R&I policy
 - Sectoral policies
- In all targeted scenarios R&I priorities are a mix of four types of R&I
 - solutions oriented R&I,
 - understanding oriented R&I,
 - regulatory science and policy knowledge, and
 - scaling up solutions and social innovation
- (Most) targeted scenarios are comparatively open
 - Open-ended vs. clear targets

*Intelligent
combinations
of different
types of R&I*

Conclusions: Towards a new mode of governance

- The role of sectoral policies
 - Political goals behind missions are often defined by sectoral policies (e.g. in energy, mobility, security, etc.)
 - Demand-side and sectoral policies are crucial for subsequent uptake/scaling
 - Trade-off between the longer term time horizon characteristic of research when giving sectoral policies (and their shorter-term agendas) a stronger role
- Coordination with national policies
 - Policy implementation is often national, in particular also several sectoral policies
- Public and stakeholder engagement
 - A wider range of stakeholders needs to be involved in the definition of agendas and the implementation of policies, in appropriate formats
- Taking uncertainty and modesty seriously
 - R&I agendas cannot be derived deductively from a single “vision”; instead iterative adjustment of ambitions necessary, based on new insights from understanding-oriented research of the challenge at stake

Conclusions: Towards a new mode of governance

- A new mode of more open programming
 - Ensure diversity by calling for a broad range of possible inroads to “solutions-oriented research”,
 - Integration of scaling and selection process, rather than top-down work programmes and topics
 - Users/beneficiaries/stakeholders involved at all stages (though to different degrees),
 - Much stronger role of programme management in ensuring integration of different activities towards the overarching goal or “mission”,
 - New approach to monitoring and evaluation (outcome focus) to ensure reflexive and dynamic policy design.

- Are transformative ambitions and missions opening up Pandora’s box?
- Policy coordination vs. dedicated carrier organisations?
- Organisational capacities along the entire programming cycle

Conclusions on the foresight process and network model

- „Performative“ foresight has impacts on individuals, organisation and beyond
 - Context scenarios, missions and targeted scenarios serve as common reference points for EC-internal debates
 - Transformative approach triggers thinking beyond S&T in R&I-related policy
 - Foresight provides interaction interface between intra- and extra-organisational network, with changing weight of the two networks along the process
 - Mutual reinforcement and validation takes place between the networks in terms of relevance and quality
 - Foresight process using an intra-organisational network operates as „harmonisation device“
- Open questions for subsequent research
 - Does BOHEMIA influence the formation of future policies and FP 9?
 - Does BOHEMIA set a standard in terms of framing and justifying future „missions“?
 - Does it help improve alignment between R&I and sectoral policies?
 - Does it have any impact on the formation of wider ecosystems?

- **Phase 1:** Extensive review of available foresight to produce meta-scenarios relevant for Europe and deeper insights in topical fields (published in June 2017)
- **Phase 2:** Delphi survey to gain insights on future technologies, societal issues, and R&I practices based on the scenarios (published in November 2017)
- **Phase 3:** Analysis to combine meta-scenarios and Delphi results into targeted scenarios; online consultation and policy recommendations (published in May 2018)



The report describes a range of futures we might be facing in the 2030s, and suggests ways how research might create options for Europe to cope and flourish.



This report describes the full results of the Delphi survey, covering 150 statements about the future of research and innovation in Europe



The report describes four transitions as orientating frame for future European R&I policy, and positions 19 targeted scenarios as candidate missions on that landscape.

Contact:

Dr. Matthias Weber
AIT Austrian Institute of Technology
Center for Innovation Systems and Policy
Vienna

matthias.weber@ait.ac.at

Download scenarios report, Delphi report, and final report at:
<https://ec.europa.eu/research/foresight/index.cfm?pg=strategic>