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# Reflections on a Vision for a Future *European Knowledge Area*

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# Colophon

**Reflections on a Vision for a Future European Knowledge Area** is a publication of the Flemish Government, Department of Economy, Science and Innovation

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This position paper prepared by the Flemish Department of Economy, Science and Innovation (EWI) is the result of the joint effort of many individuals whom we would like to thank for their effort and involvement. In particular, the EWI colleagues who are members of the thematic team on internationalisation and the members of the working group 1 (on Horizon 2020) of the EWI stakeholder platform on international policy. A special thanks goes to Stephanie Agten for managing the interactions with the stakeholders and drafting a first summary of their inputs.

This stakeholder platform brings together civil servants from the relevant Flemish governmental departments and agencies as well as representatives from all types of stakeholders (academia, industry, civil society) and official advisory boards to discuss issues related to international science and innovation policy with a focus on European issues.

However, their individual contributions and involvement do not necessarily imply their (or their organisation's) consent on the entire position paper, precluding them (and their organisation) from expressing divergent opinions in other papers or at other occasions.

The list of participating stakeholder organisations (Working Group 1) is as follows:
*KU Leuven, University of Antwerp (UAntwerpen), Ghent University (UGent), University of Brussels (VUB), Hasselt University (UHasselt), Flanders Innovation and Enterprise (VLAIO), Research Foundation Flanders (FWO), Flemish Advisory Council for Innovation & Enterprise (VARIO), Belgian industrial Research and Development (BiR&D), Liaison Agency Flanders-Europe (vleva), University of Applied Sciences Vives (Viveshogeschool), University of Applied Sciences Karel de Grote (Karel de GroteHogeschool), Belgian Federation for Chemistry and Life Sciences in Flanders (essenscia vlaanderen), Ghent University of Applied Sciences (HoGent), PXL University of Applied Sciences (PXL Hogeschool), Artevelde University of Applied Sciences (Artevelde Hogeschool), University of Applied Sciences Odisee, LUCA School of Arts, Interuniversity Micro-Electronics Centre (imec), Flemish Institute for Technological Research (VITO), Flemish strategic research centre for the manufacturing industry (Flanders Make), Research Institute Nature and Forest (INBO), Research Institute for Agriculture, Fisheries and Food (ILVO), Flanders Marine Institute (VLIZ), Agrolink Flanders, Flemish Interuniversity Council (Vlir), Flemish Council of Universities of Applied Sciences and Arts (VLHORA), NXP, Siemens, Sirris, Nokia, Barco, Flanders innovation cluster for logistics (VIL), Agoria, Smart Grid Flanders, Strategic Initiative Materials in Flanders, The Blue Cluster*

DEPARTMENT OF
ECONOMY, SCIENCE & INNOVATION

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# Executive Summary

This paper presents a conceptual framework for a renewed vision for a future European Research Area. As it is a quite fundamental and strategic exercise, we considered it worthwhile to draft these reflections in a position paper and share them with other, interested parties. It complements the recommendations of the ERA Ad Hoc Working Group on the future of ERA by designing a consistent and modular conceptual framework as the basis for a renewed vision on the ERA.

Flanders' vision on a renewed ERA is built on the following core ideas :

- Free circulation of knowledge remains at the core:
  - Knowledge circulation is situated in the quadruple helix model involving knowledge institutes, industry, government and civil society spanning multiple levels of governance (local up to European)
  - Knowledge circulation is from a societal perspective contextualised within the Sustainable Development Goals (SDGs) that are globally recognised
- Knowledge comprises research and innovation[1] (R&I) as two indispensable and complementary phases in the R&I cycle. Providing a framework for all types of research and innovation and linking it to education and training is of the highest importance to continuously extend our knowledge base.

As knowledge is the element common to research, innovation, education and training, we prefer to change the name of the renewed ERA to European *Knowledge* Area (EKA). We consider knowledge as having three different dimensions:

1. Embedded/codified knowledge contained in papers, patents, products, etc
2. Knowledgeable individuals who acquired their expertise through education and experience
3. Knowledge-based organisations "processing" knowledge as part of their mission statement

At the conceptual heart of the EKA, the "knowledge wheel" is continuously spinning and comprises four (sequential) functions:

1. Knowledge (co-)creation: knowledge is produced (in many cases through cooperation)
2. Knowledge circulation: knowledge is disseminated through various channels
3. Knowledge absorption: knowledge is internalised by individuals and organisations
4. Knowledge application: knowledge is used in all sorts of situations and contexts

All of these four functions are taken up by the four actor types of the quadruple helix. E.g., large companies can have an in-house research division, and governments can have their own scientific institutions. Various combinations of function and actor type are possible, even simultaneously, with an additional distinction of a demand vs. offer perspective. The government has an additional (and exclusive) function of facilitating the well-functioning of the knowledge wheel. The governmental actor should have a multi-level governance structure as the involvement of citizens and civil society organisations implies interaction at "short distance"

The EKA embeds the values that are part of the Treat on the Functioning of the European Union (TFEU), namely respect for human dignity, freedom, democracy, equality, the rule of law and respect for human rights. They are complemented by a few other ones, linked to knowledge circulation,

- Compatibility
- Diversity
- Accountability
- Commitment

[1] In this text we follow the definition of the OECD Oslo Manual 2018 on innovation: "a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)" cf. https://read.oecd-ilibrary.org/science-and-technology/oslo-manual-2018/glossary-of-terms_9789264304604-15-en#page6. Innovating activities, such as R&D, can lead to innovations.

- Solidarity
- Reciprocity
- Inclusiveness
- Excellence
- Adaptivity

In the operationalisation of these values into the EKA, some principles have to be upheld:
- Research and Innovation are two indispensable and complementary phases in the R&I cycle
- Multi-level stakeholder involvement and co-creation increase the relevance of R&I
- Policy-led R&I benefits from directionality
- The R&I cycle thrives on bottom-up initiatives
- Effective alignment of R&I policies and priorities contribute to addressing global challenges
- Smart and fair cooperation with third countries offers mutual benefits
- Keep governance structures and procedures as simple as possible
- Responsible Research and Innovation inspire trust to the citizens
- Monitoring and data gathering support evidence based improvement of local policies

For each knowledge dimension (codified, individuals and organisations), various dedicated supporting actions and initiatives can be set up by MS/ACs according to the status and performance of their national and regional R&I system, as long as the overall goal remains to contribute to the overall progress of a future EKA. For the first two dimensions (embedded knowledge and knowledgeable individuals), ample suggestions are given. For the last dimension (knowledge-based institutions) we limit ourselves to describing the many possible activities (of which many are already supported by MS/ACs in some way) that can take place, leaving it up to the MS/ACs to reflect on their local situations to define more elaborated and appropriate suggestions for actions, support or other forms of facilitation.

Frequent monitoring is needed to ensure a steady and sustained progress towards an ever improving EKA, including regular moments of critical reflections and revisions.
Initiatives to support a future ERA can be divided into major (policy) initiatives and actions (*priorities*) supporting the three knowledge dimensions, which in turn can be divided (by means of stepwise refinement) into initiatives and actions of a more limited scope and time period.

We also provide some concrete suggestions regarding potential priorities on mobility and the involvement of the civil society. An outline of a governance structure is drafted., which remains close to the current structure. In addition, we present our views on a newly proposed concept of a “lighthouse”, which was proposed by the ERAC Ad Hoc Working Group on the future of ERA.

As the EKA is said to be a partnership between the Member States, Associated Countries and the European Commission, each party is responsible for actions within its remit and competencies. In addition, joint actions covering competencies of both the Commission and countries are needed.

The combination of a a simple yearly monitoring process complemented by a more in-depth two-yearly assessment of the achievements should reveal the progress towards a better performing EKA.

Although we have tried to sketch a broad conceptual framework, we do not aspire to achieve exhaustivity, in particular regarding values, principles, priorities and more elaborated actions. On the contrary, we invite the reader to complement our ideas in order to enrich the discussion in the aim to contribute to and co-create a renewed vision on a future EKA.

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# 1 Background

## 1.1 Context

The starting point for a reflection on a new or rather renewed vision on a future ERA is the Treaty on the Functioning of the European Union (TFEU), as all **EU Member States and the European Commission** have signed the treaty and, hence, are bound by it. Three articles are relevant:

> *Article 2*
> The Union is founded on the values of respect for human dignity, freedom, democracy, equality, the rule of law and respect for human rights, including the rights of persons belonging to minorities. These values are common to the Member States in a society in which pluralism, non-discrimination, tolerance, justice, solidarity and equality between women and men prevail.
>
> *Article 179*
> 1. The Union shall have the objective of strengthening its scientific and technological bases by achieving a European research area in which researchers, scientific knowledge and technology circulate freely, and encouraging it to become more competitive, including in its industry, while promoting all the research activities deemed necessary by virtue of other Chapters of the Treaties.
>
> 2. For this purpose the Union shall, throughout the Union, encourage undertakings, including small and medium-sized undertakings, research centres and universities in their research and technological development activities of high quality; it shall support their efforts to cooperate with one another, aiming, notably, at permitting researchers to cooperate freely across borders and at enabling undertakings to exploit the internal market potential to the full, in particular through the opening-up of national public contracts, the definition of common standards and the removal of legal and fiscal obstacles to that cooperation.
>
> 3. All Union activities under the Treaties in the area of research and technological development, including demonstration projects, shall be decided on and implemented in accordance with the provisions of this Title.
>
> *Article 185*
> [...]
> 5. As a complement to the activities planned in the multiannual framework programme, the European Parliament and the Council, acting in accordance with the ordinary legislative procedure and after consulting the Economic and Social Committee, shall establish the measures necessary for the implementation of the European research area.

Over the years, the **Council of Ministers** responsible for Science (and Innovation) has adopted several conclusions on the ERA. In the Conclusions of 2008, the Council published its visions of an ERA in 2020:

> 6. CONSIDERS that this long-term vision for ERA should be based on the broad Lisbon goals to make Europe a leading knowledge economy and society based on the "knowledge triangle" of research, innovation and education, as major drivers of competitiveness and quality of life. The vision should i.a. include the following features:
> a) free movement of knowledge, the 'fifth freedom', with excellent training and attractive career prospects for researchers moving and interacting freely across Europe;
> b) modern universities and research organisations developing globally competitive poles and networks to deliver excellent science and technology throughout Europe with an optimal mix of specialisation and variety;
> c) favourable conditions for all actors in research and the private sector, including SMEs,
> to investing in research and exploiting its results, having access to world-class research infrastructures (including those of pan-European interest identified in the ESFRI roadmap), participating in open and well-coordinated research programmes, sharing and using knowledge across sectors and borders, and developing strong links and coordinated cooperation with partners outside Europe;

d) benefits for citizens from the contribution of large-scale R&D efforts to solve major societal challenges;

In its latest Conclusions, (of 2015) the Council called upon the Member States to draft their national action plans in the context of the ERA Roadmap to deepen the development of the ERA, in particular through actions to further implement the six ERA priorities.

These priorities refer to the priorities put forward by the **European Commission** in its Communication on the ERA in 2012:

1. Effective national research systems
2A Jointly addressing grand challenges
2B 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

In that Communication the Commission defines the ERA as:

> a unified research area open to the world based on the Internal Market, in which researchers, scientific knowledge and technology circulate freely and through which the Union and its Member States strengthen their scientific and technological bases, their competitiveness and their capacity to collectively address grand challenges

In a more recent Communication by the Commission (2015), the ERA has been summarised in terms of "open science, open innovation, open to the world"[2].

Next to these official documents, various papers and publications on the ERA exist, such as papers published by individual countries or European stakeholders associations (e.g., LERU[3]). But usually these do not really comment on the vision, but rather on operational aspects. Also interesting to recall is the FP7 project VERA[4] (Forward Visions on the European Research Area).

## 1.2 Material and Method

As the new Commission intends to issue a new Communication on the future of the ERA, the ERAC has set up an ad hoc working group to draft an Opinion that will be given to the Commission to serve as a source of inspiration for its forthcoming Communication. Hence, the Member States and Associated Countries (MS/ACs) are reflecting as well on a renewed ERA. This process started before and happened in parallel with the drafting of this text. Therefore, not all elements in this text have been presented to the ad hoc working group, and even if done so, this does not imply that they have been included in the ERAC opinion.

In the particular exercise organised within Flanders, it was a deliberated choice to start from scratch (except for the context as sketched above) to allow for better outside of the box thinking. Therefore we do not review past Communications and Council Conclusions[5] when reflecting on a renewed vision for the ERA.

In our Flemish reflection exercise with the stakeholders four big steps have been considered:

1. Brainstorming on key values, principles, concepts, … etc. underpinning a renewed ERA

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[2] K. Walsh (ed.), (2016), Open innovation, open science, open to the world – a vision for Europe, DG RTD – Directorate A, Unit A1

[3] https://www.leru.org/publications/leru-universities-want-an-era-of-change-after-the-eu-elections

[4] http://eravisions.archiv.zsi.at/index.html. It is surprising (or actually rather not) to find that quite some statements, issues and recommendations, although published in 2015, are still valid today.

[5] We refer the readers who are interested in the historic overview of the ERA to the report of the European Parliamentary Research Service (PE 579.097): V. Reillon, (2016), The European Research Area: Evolving concept, implementation challenges – In-depth analysis.

2. Combining them into triples reflecting the as-is and to-be situations
3. Defining several scenario's in a "quadrant setting"
4. Writing a policy narrative for the "wished for" scenario
5. Trying to transform the narrative into a compelling "story" [= outreach material for lay people]

The remainder of this document is a position paper which includes the material that resulted from above mentioned phases 1 – 2[6] with the help of our stakeholders. The working method and timing of the ERAC Ad Hoc Working Group on the Future of ERA gradually diverged from those of our stakeholder exercise[7]. Despite the common starting point (focus on knowledge circulation) and cross-pollination of some ideas (e.g., the knowledge wheel), there are also clear differences (quadruple helix, lighthouse) between the text produced by the working group and this position paper.

Importantly, we do not provide an exhaustive description of a renewed ERA. We start from a concise vision, its building blocks and conceptual architecture (section 2), define a number of basic values underpinning the renewed vision (section 3), and elaborate some principles that should guide the way in which the EKA is implemented (section 4). As we want to give some concrete guidance on how to set up the EKA (section 5), we sketch various suggestions for concrete actions centred around three knowledge dimensions (section 5.2) and discuss notions such as "EKA priority" (section 5.3) and the lighthouses (section 5.4.3). This position paper is concluded with a brief summary (section 6).

[6] The "quadrant exercise" and the "compelling story" steps have been skipped for this document due to timing constraints as we wanted a draft version of this position paper to be more or less ready by the RPG (mid-September), the European R&I Days (end of September), and the ERAC (early October). The final version is used to prepare the Flemish chapter of the Commission's "ERA tour des capitales" in January.

[7] At the time of publication of this document, the exercise with the stakeholders (steps 3, 4 & 5) had been put on hold and replaced by the above mentioned "tour des capitales".

# 2 An overall vision

## 2.1 Conceptual architecture

Flanders' vision on a renewed ERA is built on the following core ideas (cf. section 2.2):

- Free circulation of knowledge remains at the core:
  - Knowledge circulation is situated in the quadruple helix model involving knowledge institutions, industry, government and civil society spanning multiple levels of governance (local up to European)
  - Knowledge circulation is from the perspective of societally contextualised within the Sustainable Development Goals (SDGs) that are globally recognised
- Knowledge comprises research and innovation (R&I) as two indispensable and complementary phases in the R&I cycle. Providing a framework for all types of research and innovation and linking it to education and training is of the highest importance to continuously extend our knowledge base.

As knowledge is the element common to research, innovation, education and training, we prefer to change the name of the renewed ERA to European *Knowledge* Area (EKA). We consider knowledge as having three different dimensions:

1. Embedded/codified knowledge contained in papers, patents, products, …
2. Knowledgeable individuals acquired through education and experience
3. Knowledge-based institutions "processing" knowledge as part of their mission statement

At the conceptual heart of the EKA, the "knowledge wheel" is continuously spinning and comprises four (sequential) functions:

1. Knowledge (co-)creation: knowledge is produced (in many cases through cooperation)
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3. Knowledge absorption: knowledge is internalised by individuals and organisations
4. Knowledge application: knowledge is used in all sorts of situations and contexts

All of these four functions are taken up by the four actor types of the quadruple helix, namely academia, industry, civil society organisations and governments (cf. section 2.6). Various combinations of function and actor type are possible with an additional distinction of a demand vs. offer perspective. The government has an additional (and exclusive) function of facilitating the well-functioning of the knowledge wheel. The governmental actor should have a multi-level governance structure, in particular as the involvement of citizens and civil society organisations implies interaction at "short distance".

A conceptual architecture for a future ERA can be articulated as a stable core with an adaptable societal layer around it (cf. section 2.7).

## 2.2 Core ideas

From the section 1.1, it is clear that "**free circulation of knowledge to enhance competition**", also dubbed the *5th freedom*, is the very core idea of the ERA, with the implicit assumption that the increased competition thanks to an easy circulation of knowledge enhances the quality of the knowledge produced (excellence).

The future ERA is embedded in and should support the overall set of values of the European Union, such as equality, democracy, and solidarity to quote only a few. And as we may reasonably regard the Horizon Europe framework programme as an instrument to support the new ERA, the importance which the Horizon Europe Decision proposal attaches to the Sustainable Development Goals (SDGs) should to some extent also be reflected in the vision for a future ERA.

In our vision for a future ERA, the core has to remain the free circulation of knowledge (following the agreed TFEU art.179). Knowledge should not only encompass science (usually leading to codified knowledge) but also innovation (technological as well as societal/social) and experience (implicit or even tacit knowledge) as represented by the concept of the knowledge triangle. This fits in better with the principle of the quadruple helix that combines four type of actors, namely government, academia[8], industry and civil society (see section 2.6). It implies that education and training are also to be regarded as important for a future ERA, although in a less prominent role. In addition, we consider knowledge circulation to be only one function (out of four) of the knowledge cycle (represented as the knowledge wheel).

## 2.3 Knowledge is the axis

Contrary to what its denomination seems to suggest, the ERA not only addresses research, but also includes **technology** (for the sake of industrial competitiveness). Nowadays, we would call this "innovation". In the ERAC opinion on the ERA roadmap, it is stated that *it is important to underline that the Roadmap (like the ERA itself) covers both **research and innovation.**[9]* The knowledge triangle nicely illustrates the importance of knowledge for education (and training) as well. In practice the Knowledge & Innovation Communities of the European Institute of Technology (EIT-KIC) are a direct implementation of the knowledge triangle concept. Hence, knowledge is the common element to research, innovation, education and training,. Consequently, we propose to replace the current denomination of ERA and label the future ERA as "**the European Knowledge Area**".

## 2.4 At the centre of the knowledge wheel

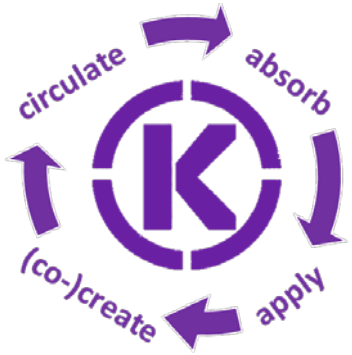


**Figure 1: The knowledge wheel**

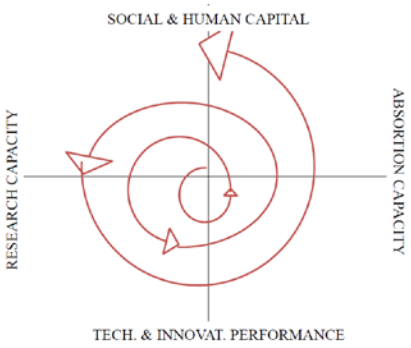


**Figure 2:: The virtuous growth model**

The "knowledge wheel" basically comprises four different and consecutive stages: knowledge (co-)creation, knowledge circulation, knowledge absorption and knowledge application. These four stages involve all four type of actors in various configurations or at different points in time. Creating knowledge is the process of adding to the current state of the scientific art or state of technology. Without proper dissemination, new knowledge remains undiscovered and unknown to the larger part of the community. But even if knowledge is available and accessible, individuals and organisations have to become acquainted with it and integrate it cognitively before they can apply it in their activities. According to Soete[10], the knowledge wheel lies at the basis of a virtuous growth model (cf. Figure 2).

## 2.5 Comprising three dimensions

When considering the different functions of the knowledge wheel, three knowledge dimensions are each time involved:

[8] Academia is understood as both universities and universities of applied sciences.

[9] ERAC Opinion on the European Research Area Roadmap 2015-2020 (1208/15) [boldface = original layout]

[10] Luc Soete, (2019), Completing and/or enlarging the ERA, presentation at the Research Policy Group meeting in Leuven (13/09/2019), https://www.ewi-vlaanderen.be/nieuws/toekomst-europese-onderzoeksruimte

1. The knowledge itself, possibly codified (e.g., in papers or patents) or embedded in products, processes, services, business models, etc.
2. Individuals seeking or embodying knowledge (acquired through education and/or experience)
3. Organisations consisting of individuals to "do something" with knowledge in a specific way

The functions of the knowledge wheel can be taken up by individuals or by organisations where individuals cooperate to have the organisation execute its mission. E.g. the larger part of a university consists of academic researchers who create and disseminate their research results and absorb, apply and build on research results by other researchers. Relevant government administrations largely consist of policy advisors who, based on experience and insights from academia, create and apply adequate framework conditions (legislation, funding opportunities, etc. ) to support R&I activities and publicise them to make potential beneficiaries.

In section 5.2, we propose to organise actions for the EKA along these three dimensions, namely measures addressing the knowledge wheel functions from the perspective of knowledge as an object (e.g. knowledge repositories), of individuals (e.g. mobility) and of organisations (e.g., technology transfer offices).

## 2.6 In a multi-level quadruple helix setting

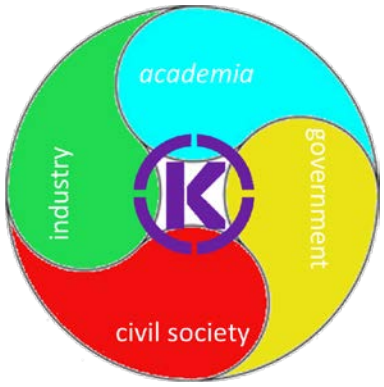


**Figure 3: The quadruple helix**

The four type of actors mutually interact with one another in various configurations (directly vs. indirectly, as sender vs. receiver, as initiator vs. follower, offer/push vs. demand/pull , etc.) but can perform all of the four above mentioned functions (co-creation, circulation, absorption and application) of the knowledge wheel, and sometimes even at the same time. The government is responsible for a specific, and important, additional meta-function of **facilitating** and providing the ideal framework conditions to foster the spinning of the knowledge wheel with active involvement of all quadruple helix actor types.

The EKA, by definition, combines the European level as well as the (sub)levels of Member States (and Associated Countries) with their local and specific societal contexts. One important element of the local context is how the local competencies regarding research, innovation, education and training are divided between the various ministries and governance levels. In many countries, education is devolved to the regional level. In some countries innovation (mainly driven by the European Structural Funds) to a large extent falls within the competence of a region. In other countries, the regions are responsible for a large part of the research budget. Belgium, with its high level of regional competencies for all four policy areas mentioned and its lack of hierarchy between the federal state and the federated entities, is an example of a country where R&I competencies are devolved to a very high extent to a subnational level. This illustrates the importance of not restricting the EKA to the European and national levels alone.[11] In particular, when the aim is to invite citizens and civil society to take part in a co-creation process, the level closest to the citizens is probably best suited to engage those citizens (or their representing organisations)[12].

Hence, a multi-level governance system including subnational levels is needed to facilitate and foster the EKA. Obviously, this requires a well performing concertation structure within the national boundaries with at least one governmental actor being responsible for organising and facilitating the concertation process.

[11] Luc Soete (2015), From the old ERA to a new era of "Open Knowledge Creation in Europe, Policy Brief by the Research, Innovation, and Science Policy Experts (RISE) June 2015 (EUR 27432 EN), DG RTD -Directorate A - Unit A6

[12] In some cases, this could even be at the city level.

## 2.7 Giving ample consideration to the SDGs

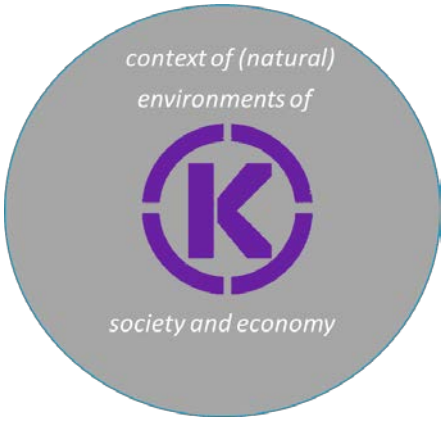


**Figure 4: the socio-economic context**[13]

Knowledge is not an isolated factor of society. Even knowledge for the pure sake of knowledge is embedded in a certain societal context, thriving on policies favourably supporting blue sky research. A current societal trend is to have the SDGs give directions to many policy orientations and choices – including the Horizon Europe framework programme that stipulates that 35% of the budget should be spent on climate objectives. Another trend, which is also part of the SDGs on democracy and included in the proposed Strategic Plan for Horizon Europe, concerns the declining trust in authoritative sources such as scientific evidence and the deliberate rejection of evidence-based policy making (which threatens the basics of our democratic systems) and international cooperation and arbitration mechanisms.

Without focusing too much on these specific examples, it becomes clear that knowledge nowadays is regarded as a serious leverage for "societal improvement" on all levels and for all types of (societal) organisations, not limited to research institutions and/or private enterprises. Consequently, a conceptual architecture of a flexible and modular EKA can be constructed consisting of a stable core wrapped in an adaptable societal layer that evolves along the major trends in society (with nowadays a major focus on the sustainability of our planet). E.g. specific initiatives based on the notion of policy-led demand can become part of the innovation policy mix at some point in time but the appearance (and eventual replacement) of these initiatives does not put the stable part of the EKA architecture into question. The fact that the vision (but unfortunately also problematic issues) on the ERA over the past 20 years has remained quite stable already proves that such a stable core of a conceptual architecture for the ERA/EKA is achievable.

## 2.8 Combining the above

A well-functioning EKA is supposed to foster interaction between the four type of actors who are jointly responsible, but possibly in varying variable geometry combinations, for executing the four functions of the knowledge wheel (cf. section 2.4). The overall societal context involves striving for sustainability and supporting the SDGs (cf. section 2.7). However, this context has an impact on the actual content of the knowledge (cf. section 2.2) rather than on the mechanics of how the actors make the knowledge wheel spin.

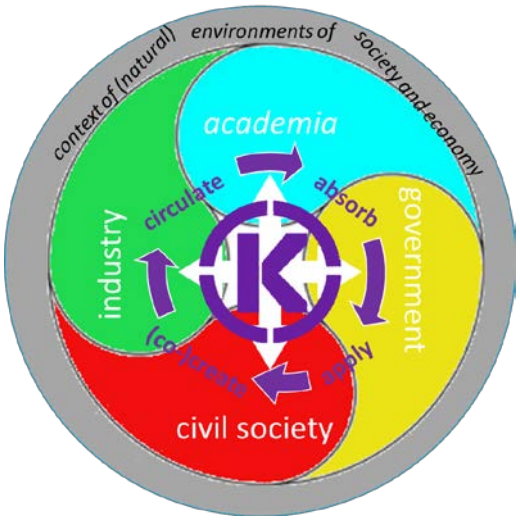


**Figure 5: The complete EKA architecture**

Improving the EKA means improving the way how embedded or codified knowledge (cf. section 5.2.1) is on offer or in demand in the European Union by some knowledge-based organisation (cf. section 5.2.3) that consists of knowledgeable individuals (cf. section 5.2.2) who are responsible for one of the four tasks of the knowledge wheel.

The way the EKA functions (and is improved) has to comply with the basic values (cf. section 3) agreed upon by the Member States of the European Union (and shared by the Associated Countries) and respects the implementing principles of the EKA set-up (cf. section 4).

[13] Inspired by Carayannis et al. Journal of Innovation and Entrepreneurship 2012, 1:2, The Quintuple Helix innovation model: global warming as a challenge and driver for innovation

# 3 Values of the EKA

**The current TFEU** explicitly mentions societal and political values (cf. section 1.1), not all of them being directly applicable to the knowledge wheel (and ensuing practices). Some of them (e.g., *respect for human rights* or *equality*) could become relevant in R&I cooperation schemes with countries outside of Europe when R&I cooperation increasingly becomes a matter of R&I diplomacy. Others can be regarded as framework conditions, in particular legal labour conditions, for knowledge workers. These values support the free movement of researchers rather directly (e.g., *respect for human rights*, *human dignity*, *non-discrimination*, and *equality between men and women*). It is easy to translate these values into terms of equal payment, and equal career opportunities not based on gender nor ethnicity. Employers have to respect the *rule of law* in those matters. *Tolerance* and *pluralism* can be mapped onto respecting different scientific opinions as long as these are fact and evidence based (e.g., no government policies based on "alternate" facts) and as being respectful towards "scientific opponents" as persons (no a priori biased reviews or evaluations based on sentiments).

Of all these values, freedom remains the most basic, essential and typical value of our European societies. It can be translated into academic freedom (i.e. a researcher decides autonomously on the topic, the method, the location, the publications etc. provided they adhere to the principles of responsible R&I), into entrepreneurial freedom (i.e. an entrepreneur chooses freely which business they want to set up in a location and with whom they trade provided they respect the rule of law), into the freedom a citizen enjoys (i.e. to look for and use available knowledge to protest against certain practices in society, as long as they respect the *democratic* principles and the rule of law) and into the freedom of civil servants to denounce unlawful behaviour of a politician misusing alternate facts provided (they respect internal confidentiality rules).

*Solidarity* between Member States implies that, even when behaving as competitors to facilitate their national actors, Member States cooperate in providing a level playing field for all actors (e.g., by promoting transparency and openness in R&I partnerships).

**For the renewed vision on an EKA**, we feel that some additional values should be included which follow quite straightforwardly from the initial vision on free circulation of knowledge.

Compatibility:
Ideally procedures (legal, fiscal, review and evaluation criteria, visa, etc.) are harmonised in the sense that the processes implementing a procedure are made uniform or even identical and common. If that is not possible due the diversity of the various national R&I systems, at least the outcomes of the variants of a procedure should be recognised and certified as being equivalent. E.g., the evaluation procedure in the Horizon programme is identical and common for all submitters irrespective of their geographical origin and affiliation.. Evaluation procedures in P2P partnerships are much more diverse and less uniform. They need consensus from each funding partner, but are all based on the principle that the proposals best fitting the criteria are the ones to be accepted (following the excellence principle, without external influence). The lead agency idea is that one agency fully trusts another agency adequately to carry out the evaluation process, and that the outcomes can be carried over. Another example of compatibility concerns the equivalence of Master or PhD degrees that should be recognised (mediating certification) for R&I job applications in other European countries than that where the degree was awarded (as is already happening now).

Diversity
National R&I systems (and related framework conditions) have grown over time and evolved differently in the various European countries. Some seem to be more successful than others (also depending on the perspective taken) on certain issues or even in their entirety. The various national R&I systems in Europe should contribute to the same goal, namely a well performing EKA, taking their idiosyncrasies as a starting point but working towards the same set of goals (hence the value of compatibility – see above). One size does not fit all. However, the common and overarching renewed EKA vision cannot be diluted using

diversity as an argument or excuse for maintaining the status quo in a local R&I system if evidence suggests otherwise.

Accountability
Diversity goes hand in hand with accountability. If governments, organisations or individuals prefer to maintain their method of operation (even if the targets are commonly agreed upon or compatibility is ensured), they must assume responsibility for not acting to improve the performance level of their systems, procedures, actors, proposals, etc. and be held accountable.

Commitment
Actors should clearly commit to participating in and contributing to the EKA, but proportional to their ability and power to contribute. E.g., the 3% R&I intensity has been a target for a long time, and many countries still commit to reaching this target in their policy statements. However, reality clearly proves otherwise. Although commitment (levels) on specific actions or objectives may differ, each Member State and Associated Country should show sufficient commitment to the EKA in general, effective compliance with its values and principles and sustained progress towards its goals as expressed in priorities and related activities (cf. section 5.3). To measure a nation's political willingness and commitment to invest in R&I (the 3% R&I intensity target), one could take the share of the budget (or effective expenditures) reserved for R&I compared to the total government budget (instead of the gross domestic product).

Solidarity
Only if actors live up to their commitment, can they expect solidarity, and vice versa. With the help of other actors (the application of solidarity), actors can acquire the capacity to fulfil their commitments and better comply with the EKA objectives (than previously). Thanks to solidarity, a level playing field can be created for all actors. Sharing best practices, scientific knowledge and technology, for instance, can help developing countries to address climate change issues themselves more quickly and more efficiently. Solidarity can be used as an asset in transnational and international cooperation (in the context of R&I diplomacy – cf. section 4.6).

Reciprocity
Sharing best practices, scientific knowledge, and technology only works if all actors, in particular receiving parties, effectively (and proportionally) invest in the cooperation. The open and free availability of knowledge should not result in an overall decrease in R&I investment by actors who simply take advantage of investments made by other actors (no free riders).

Inclusiveness
Closely linked to solidarity is the principle of inclusiveness. All actors should enjoy *equal opportunities* (level playing field) to participate in and benefit from the EKA irrespective of their type, geographical location, origin, size, gender, colour etc. Involving, all kinds of stakeholders through the quadruple helix should help to achieve more inclusiveness.

Co-creation can help to achieve inclusiveness as the various (types of) stakeholders can have their say on how EKA priorities and objectives are implemented. Even if excellence (see below)) can over time result in a seemingly too excessive concentration of knowledge (in hot spots), care should be taken to avoid the emergence of "knowledge deserts". In the EKA, no country, region, or actor should fear being "left behind". But that is precisely an aim of the free circulation of knowledge across the EKA, and requires local commitment and reciprocity and transnational solidarity and inclusiveness.

Excellence
However, equal opportunities is not the same as *equality*. Circulation of knowledge leads to a competition between ideas, scientific insights, technologies, products, etc. in which the "best" one wins. Naturally, the "best one" depends on the perspective taken. Hence, excellence is not absolute, but a relative concept: the best one according to criteria, framework or perspective relative to the quality of the content[14]. The

[14] To avoid misinterpretations, this is not at all a plea for a prominent use of "secondary" criteria or criteria that are external to the actual knowledge or have no inherent relationship with its merit.

notion implies inequality by definition (meaning to 'stand out'). If all actors (e.g. scientists) were excellent (considered from the same perspective), there would be no more excellent actors since they would all be on a very good but nevertheless equal level.

Adaptivity

Adaptivity can be seen as a variant of *tolerance*, in the sense that actors not only respect diversity in scientific opinions, competing products, different policies, etc., but are also able to adapt their opinion, product, policies, … to a changing scientific, technological or societal context.

# 4 Some EKA implementing principles

## 4.1 R&I as indispensable and complementary phases in the R&I cycle

A core idea of the EKA should be a linkage of research & innovation[15] (in older texts alternatively referred to as science & technology). All types of research (including blue sky research) and innovation (radical, incremental, transformative, social, etc.) are to be regarded as being as on an equal footing to eventually solve problems and offer innovative solutions that impact people's lives. The current priorities are valid for both research and innovation (pending some specificities), and many of the EKA actions on (sub)national level can be applied to research as well as innovation.

Closing the "know-do gap" and adopting a more holistic view on R&I are necessary. Knowledge circulation is crucial to close the aforementioned gap. It would be counterproductive when addressing global societal challenges to focus primarily on generating scientific impact without considering support for knowledge diffusion nor its translation into practice oriented solutions (the old linear model of innovation)..

## 4.2 Increase multi-level stakeholder involvement and support co-creation

More (types of) stakeholders should become increasingly involved in the co-creation of knowledge, as "user involved R&I" (citizens science and user driven innovation) is more likely to lead to practical solutions impacting people's lives as it is a demand driven process. The more diverse the (informed) stakeholders, the more robust the R&I co-creation process.

Concertation processes should be created (or adapted) to facilitate various forms of more intense stakeholder involvement. Not only citizens but regional policy makers as well should be more closely involved than in the past and should be able to take up "active roles" (more than simple observer) in steering committees, government boards or other participatory settings. The awareness by the ordinary citizens of the importance of R&I for a (sustainable) society will grow, as well as his/her trust in the results of R&I activities. Citizens, civil society organisations and/or government levels below the national level, will experience a greater sense of ownership if they are more involved in agenda-setting meetings, actual R&I activities, and possibly the progress follow-up. In return, they can become powerful advocates and defendants of R&I activities (and funding). Hence, stakeholder involvement is more than the unidirectional dissemination of R&I results but presupposes real participatory activities in the entire project lifecycle. Governments are probably better placed to create (or support) appropriate structures or platforms (cf. section 5.3.1) channelling the long term efforts towards tackling the SDGs (*policy led innovation* -,cf. section 4.4), combine global challenges with local contexts, and act accordingly to ensure that the efforts still serve the purpose (*directionality*).

On the other hand, stakeholder involvement or citizens science should generate added value and cannot become obligatory for any (type of) project in any scientific or technological domain. Stakeholder involvement is of importance specifically for challenge-driven, mission oriented, or policy led demand articulation implying a directionality towards providing solutions for societal problems, or for what are called 'wicked' problems. There should always be room for curiosity driven research on the researcher's own free initiative.

[15] In this text we follow the definition of the OECD Oslo Manual 2018 on innovation: "a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)" cf. https://read.oecd-ilibrary.org/science-and-technology/oslo-manual-2018/glossary-of-terms_9789264304604-15-en#page6. Innovating activities, such as R&D, can lead to innovations.

## 4.3 Responsible Research and Innovation inspires trust to citizens

Researchers become more and more (also morally) accountable to society for the public funding they receive and the results they produce thanks to the funding (e.g., in the field of genetic engineering). Funding for R&I is not a free lunch (but rather an investment), so R&I actors are supposed to "behave" responsibly (*responsible R&I*). Companies too must behave in a responsible way (cf. the original Google motto "do no evil"), by setting up a cradle-to-cradle production process, by reducing their carbon footprint etc.

Governments and politicians will have to (learn to) live with critical, well informed citizens, but can take advantage of concertation platforms to provide a basis for political decisions (*input legitimacy*). The wisdom of the crowd combined with expert knowledge can be a very powerful lever. Here, the importance of education and training becomes clear as they should integrate established scientific knowledge and sound technological insights. A well-educated population is generally less susceptible to fake news, propaganda and brain washing[16]. A well-trained work force is willing to absorb and apply new knowledge in professional settings. The latter is an important asset to attract foreign investment or create start-ups.

Specialised popular science and technology dissemination centres (science or technology parks or experience centres) still have a particular role to play in showing the importance of science and technology in our modern societies. "Houses, care centres, etc. of the future" are showcases for how emerging technologies can change the current way (and quality) of life and make citizens reflect on them (and their future). Moreover, it is a reason for scientists and innovators in the EKA to behave in such a way that citizens do not lose trust in the results of research and innovation. Researchers are supposed to comply with the European Code of Conduct for Research Integrity[17]. It would be good if researchers in companies adhered to the same or a similar code.

Not all scientific results and innovative technologies are clearly visible for the citizens as such; some remain "hidden" as they are combined and integrated with other (innovative) technologies in user products or services. End users are aware of the benefits a product or service delivers and the way they have to handle it (user interface, physical design, etc.). Users are often not interested in the underlying technology nor its potential societal impacts or other externalities (e.g., environmental damage, social conditions of workers, and potential health risks, etc.) of which many are included in the SDGs. Responsible R&I, in particular R&I outreach activities, can help to make a difference in this respect.

## 4.4 Policy-led R&I benefits from directionality

A more recent concept of *policy-led* R&I that includes the notion of directionality has been put forward in the mission orientation of the Horizon Europe programme by the Commission (and Mazzucato[18]). As its essence is that governments want societal challenges to be solved by R&I, it implies that neither absolute academic freedom nor complete entrepreneurial discovery are appropriate in such a context. At the other hand, as the government mainly formulates the problem to be solved ("the what") and does not pronounce itself on how to solve a problem, academics and entrepreneurs can choose the research avenue or innovative solution they want to explore. As stated earlier (cf. section 2.7), the SDGs are seen as the context for the renewed EKA. Hence, an important part of EKA activities and actions should be carried out in a policy-led manner or with instruments supporting a mission orientation, with the aim of contributing to reaching the SDGs.

Directionality implies that the range of options (academic or entrepreneurial) decreases (*path dependency*) as an idea is being developed into a concrete solution. Directionality also puts a higher emphasis on the need for compatibility or alignment between policies, instruments, R&I agendas,

[16] But knowing something does not automatically imply behaving accordingly (or believing/trusting it).

[17] https://allea.org/code-of-conduct/

[18] https://www.ucl.ac.uk/bartlett/public-purpose/publications/2019/jul/governing-missions-european-union

resources of all kind, etc. (cf. section 4.7). Stakeholder involvement (cf. section 4.2) indicates the direction and should also monitor and ensure that progress is made in the right direction.

## 4.5 The R&I cycle thrives on bottom-up initiatives

A classic debate, which is repeatedly held whenever research programmes are to be redefined or funding is to be redistributed and which therefore certainly merits reflection when a new vision is needed for the European Research Area, concerns the "freedom of research". Researchers are supposedly free to choose the topic of their research as they are mainly driven by scientific curiosity[19] (and sometimes serendipity) "ruled" by excellence that profits society in the long run, rather than being steered by shorter term demands by companies or governments. From an economic perspective, a similar issue exists: should a government plan control what is being produced and select winning technologies or companies instead of letting the entrepreneurial spirit thrive in a market driven competitive environment (whether regulated or not)?

Despite the relevance of directionality in policy-led demand oriented initiatives (see above), the various types of research (curiosity driven, policy led and targeted, etc.) and innovation (entrepreneurial spirit, targeted or top down state driven, etc.) *all* deserve their place, and one cannot replace the other as they are all indispensable and complementary in the R&I cycle. Moreover, real disruption and creative destruction mostly happen outside of the "mainstream" or "popular" line of R&I thinking and, in many cases, competitive advantages of ideas developed outside of the box manifest themselves only (much) later. Hence, there must always be sufficient space to support the curiosity of a researcher and the entrepreneurial spirit of an innovator.

## 4.6 Smart cooperation with third countries offers mutual benefits

Openness to the world should be considered as a potential competitive advantage to Europe. An effective strategy focusing on Third Countries that are at the frontier of science and innovation allows Europe to access cutting-edge knowledge and to mobilise a larger pool of talents. Such a strategy will act as a lever for high quality collaborations, spill overs and research and innovation excellence[20]. For this reason being open to the world must be more about than concluding as many bi (or multi) lateral cooperation R&I agreements as possible with countries all over the globe. Being able to influence global research agendas can be as important as engaging in actual joint R&I activities. In the same vein, openness to the world can be realised through contributions to international standardisation committees (e.g., for industry norms or safety regulations). Whatever the perspective, choices have to be made to select candidate countries, topics and (types of) activities for cooperation agreements, memberships, etc. which are not always solely based on R&I arguments, but also on diplomatic arguments (*science diplomacy*).

In the framework of the EKA, European Member States/Associated Countries, either together with the Commission or not, could pool resources, and align strategies and aims to conclude partnerships (in variable geometry) with third countries (or groups of countries) outside of the EU. Mechanisms to set up joint strategies should facilitate such multilateral agreements. At the same time, the European Commission and MS/ACs should avoid that actors (outside of the EU) are no longer willing to invest in knowledge creation, but instead only invest in reaping the profits from that knowledge – sometimes not even respecting IPR. Third countries should open up corresponding funding opportunities on their part, pay fair licence fees, contribute proportionally to open science repositories etc.

In the case of developing countries one could choose to be flexible in the degree of openness with which knowledge circulates to said third countries (following the solidarity principle). However, such a choice must be well deliberated, not taken automatically and nevertheless include some form of proportional

[19] This is not the same as fundamental research. Often both are incorrectly used as synonyms.

[20] Veugelers, R. (2019) ERA Outward look: a multipolar world: Europe between China and the US, Research Policy Group Meeting Leuven, (13/09/2019) [https://www.ewi-vlaanderen.be/sites/default/files/era_-_reinhilde_veugelers.pdf]

reciprocity and protection of IPR. We promote a fair openness meaning "as open as possible, but as closed as necessary".

From the opposite perspective (closedness), it is important to become more cautious concerning some strategic knowledge (e.g. on security related topics) or scientific results that can result in a big potential economic impact or technological dominance (e.g., A.I., robotics, batteries, etc.) and to not squander scientific and/or technological lead positions. With fair IPR agreements (and possibly extra safeguards) knowledge sharing is possible but happens in a cautious and controlled way.

R&I cooperation could function as a lever to promote the EU values (cf. section 3). Funding should be awarded on the basis of excellence, instead of political or personal preferences, and should avoid gender bias for instance. The ethical use of AI, including privacy protection, is to be preferred to unrestricted use of personal data by private companies.

## 4.7 Effective alignment of multi-level R&I policies and priorities contributes to addressing global challenges

In order to tackle global challenges from a mission-driven, policy-led perspective, to build large scale R&I infrastructures, or to develop disruptive technologies, governments, industry or foundations are no longer able to cater for all the investments separately, and become forced to form partnerships, share the burden and risks of investment, as well as the rights on the proceeds and results. The underlying rationale is that the pooling of efforts leads to greater effectiveness (more impact, increase in scope and scale) and efficiency (less duplication), and more synergies. This implies agreeing on common targets, roadmaps and R&I agendas and deploying joint or common initiatives, activities, policies and requires appropriate joint governance structures etc. Another consequence is that existing and varying processes and organisational set-ups tend to converge as common initiatives and partnerships require compatible ways of working and institutional contexts or framework conditions that foster such forms of cooperation. National R&I systems have developed over time along separate evolutionary paths. They exist in various forms and scopes representing different levels of investment and performance, and are embedded in different political systems. Alignment can be situated at different levels: operational (compatibility of procedures), strategic (joint targets, common longer term R&I agendas, and comparable levels of commitment) and systemic (entire R&I ecosystems are linked to one another, including adapted framework conditions). On company level, it is nowadays very clear: to remain innovative and competitive it is necessary to continue to invest in R&I, and even big companies share R&I investments and common technology platforms.

## 4.8 Keep governance procedures and structures as simple as possible

As lower levels of national governance are to be taken into account as well, the level of diversity and thus complexity is increasing as well as the risk on ending up with structures that have become unmanageable or are ineffective. In addition, the range of potential stakeholders will broaden as well. Effective *multi-level governance* structures (possibly with stepwise concertation rounds ranging from local citizens to some European committee with national delegations) are to be set up according to the local institutional context. Focus, selection and prioritisation are indispensable. Concertation structures and procedures, but also other governance procedures and rules should be kept as simple (and clear) as possible, but nevertheless be adapted to the complexity of the (sub)national R&I systems, if necessary. Simplicity of structures and procedures also implies clearly defined roles and tasks and ownership of and commitment to these roles and tasks.

## 4.9 Monitoring and data gathering support evidence based improvement of local policies

Appropriate monitoring processes help to provide the necessary information to adequately underpin policy advice as well as avoid the use of "alternate facts" to dismiss the need to adapt. Monitoring and

evidence gathering efforts should be continued to "prove" to "laggards" which are good practices to adopt and which reforms should be undertaken to improve local organisational procedures and "habits", national structures and legislation, business strategies, etc. (cf. adaptivity, p. 16).

Rather than imposing by law on all EU MS/ACs certain "avenues" toward an aligned EKA, or forcing RFOs towards imposed alignment of some (sometimes non-existing) R&I programmes, MS/ACs and RFOs should come to the conclusion themselves to reform their local system and adopt new, better practices as a result of evidence based knowledge on the performance of their R&I system (cf. accountability). In the same way as companies or researchers compete to develop a successful innovation or write a high impact scientific publication and are able to cooperate as well (as *concullegas*), governments and politicians of EU MS/ACs strive to facilitate a well performing R&I ecosystem for the national interest and cooperate (also with the Commission) on many issues, in particular on global challenges. The better the performance of a national R&I system (thanks to national investments and policies), the higher the return rate of framework programme funding for that country. National governments cannot be excused (or cannot put the blame elsewhere) for not taking appropriate actions on their level (e.g., adapting their R&I system) if sufficient evidence exists that their R&I system systemically underperforms and specific actions are required (cf. accountability, p. 16).

# 5 How to get there …

## 5.1 Walk the talk

Defining a vision and sketching a conceptual architecture is one thing, the real question is how to turn the vision into something operational impacting on reality. In order to structure this part of the discussion, we distinguish three knowledge dimensions (cf. section 2.5):

1. Embedded/codified knowledge
2. Knowledgeable individuals
3. Knowledge-based organisations

These three dimensions require adapted actions and initiatives for each of the four functions of the knowledge wheel involving all four types of actors of the quadruple helix in function of the larger societal context, c.q. the SDGs.

It is the hope that, in the context of appropriate (and partly locally customised) framework conditions, organisations and individuals all over the EU adhere and uphold the values (cf. section 3) and principles (cf. section 4) of a future EKA. In this shared spirit of striving towards a fully functional EKA (albeit an ever moving target), actors assume responsibility at their level and take appropriate actions within their reach, such as (but not limited too): adopting policies for equal opportunities, promoting an open style of science or innovation, setting up co-creation tracks, behaving ethically, taking SDGs into account, cooperating and competing, contributing to knowledge circulation platforms, participating in mobility and internship schemes, supporting life long learning for employees, embracing evidence based policy making, adhering to the excellence idea, …

A particular task is given to governments: as facilitators, governments should create the appropriate conditions for the other actors to participate and contribute in a future EKA.

In the following sections, we sketch in general terms how the actors of the quadruple helix can perform the knowledge wheel functions as it is impossible to include all specific initiatives or actions which individuals, companies and civil society organisations could undertake. Instead our suggestions mainly concern tasks and actions of governments (including the European Commission). We try to describe some important, major initiatives (*priorities*), which could be elaborated later on (by means of stepwise refinement) in more operational sets of specific sub-activities or actions of a more limited scope described in national action plans.

In defining and implementing priorities, guiding principles (cf. section 4) must be adhered to and the basic values underpinning the EKA should (cf. section 3) be upheld.

Actors can determine themselves according to their demands, abilities, and aspirations which priorities they want to focus on, which initiatives they want to undertake and which subtargets they want to achieve and when. In addition, they can and adapt their plans and actions over time in the light of a changing context as long as the overall goal remains to contribute to the overall progress of a future ERA, which most probably is a never ending process. Hence, frequent monitoring is needed to ensure a steady and sustained progress towards an ever improving ERA, including regular moments of critical reflections and revisions.

## 5.2 Suggestions for relevant EKA themes and topics

### 5.2.1 Embedded/codified knowledge

We consider embedded/codified knowledge as the "product" of knowledge (co-)creation "fixed"[21] at a point in time, and ready for dissemination, or available for absorption and use by any actor of the quadruple helix. Open science platforms are instrumental for stakeholders to become well informed, in particular as researchers are also active outside the traditional R&I context, namely in public organisations, not for profit associations or charitable foundations. Hence, supporting the construction and maintenance of all kinds of repositories (in the spirit of open science) or common technology platforms (in the spirit of open innovation with appropriate IPR and business models) seems an appropriate measure to support fruitful knowledge circulation in a fair way, while also stimulating citizen science and user driven innovation. Examples include the EOSC, which is currently being set up by the Commission with the support of the MS/ACs, for academia and the data spaces and common technology platforms (such as for AI) (planned by the Commission in partnership with MS/ACs) for industry. Other examples are the European Patent Office, and the various national patent offices, which contain publicly available descriptions of innovative ideas (mostly deposited by companies)

Other relevant support infrastructures for knowledge circulation, which could be combined with the above mentioned repositories, are sites that make individual expertise know. Well known private initiatives are LinkedIn and ResearchGate where individuals can post their professional skills, track record and cv. European sites such as Euraxess (another a cooperation between the Commission and MS/ACs) publish R&I job offers and provide (or link to) information on host universities and countries. From a domain or discipline perspective, dedicated "observatories" collect and make available overviews of organisations (all types), individuals, repositories, resources, projects, etc.

Support for such types of platforms must therefore be maintained. MS/ACs could "recommend" individual actors to (also) post vacancies on Euraxess. In a complementary way, the CERIF[22] standard could be extended to also cover information on innovation related projects, research performing organisations, individual knowledge workers, etc.[23] so that MS/ACs could set up at least one national (or several complementary subnational) CRIS[24] entry point that contains (almost) all information on the R&I knowledge base of a nation.

Next to the actions mentioned above that mainly cover knowledge storage and availability, other potential actions or activities concern the promotion and dissemination of the available knowledge. Existing repositories are the first that should undertake actions to promote the knowledge they have "in store" towards the appropriate target groups to stimulate knowledge absorption. In addition, collective R&I centres, cluster organisations or any type of hub are all suitable instruments to diffuse knowledge (and thus have an interest in linking up with knowledge repositories). E.g. future European Digital Innovation Hubs i.a. will diffuse knowledge on digital technologies within and across country borders.

In addition, countries (and regions) could (insofar as they have not already done so) create and maintain science centres that organise various events and expositions, provide material, etc. and reach out, for instance, to the general public and schools to make them aware of the general state of the art in research For the state of the art in innovation, one can think of building what is usually called "the house, the hospital, the care house, the school, the … of the future" grouping the most relevant futuristic technology to give the visitors a glimpse of how their future lives will be impacted by novel technologies (while at the same time serving as a showcase for companies working on future technologies). Evidently, such centres have to have close links with local schools, training centres or educational programmes.

[21] Even if the state of the art is always evolving, academic papers or innovative products have "fixed" a state of the art at certain point of time as if it were a snapshot that cannot be modified anymore but only replaced by a subsequent snapshot

[22] Common European Research Information Format

[23] In sofar as permitted by confidentiality

[24] Common Research Information System

### 5.2.2 Knowledgeable individuals

Actions under this section concern the free movement of individuals having knowledge and expertise "inside their heads".

**Inter country, intra actor type mobility**

Already many cross-country instruments exist on the *research* side (all kinds of long and short term mobility grants, possibility of travel included in cooperation projects, networking supporting instruments, etc.). We therefore consider that scientists are already fairly well covered. One suggestion could be to set up new MSCA co-funded partnerships on mobility for researchers, possibly focusing on extra-EU regions and/or less R&I performant EU MS/ACs to spread excellence, to enhance the compatibility between (mobility) programmes, to allow smaller non-EU countries to enter in cooperation with the EU MS/ACs and to increase the degree of inclusiveness. Another suggestion could be to include an obligatory "return clause" for some mobility instruments to avoid an intra-EU "brain shift" and the creation of knowledge deserts. Initiatives around life-long learning (and related incentives or "rewards") seem quite promising as well. More suggestions can be found in section 5.4.1. Linking up researcher mobility schemes with activities of the future European Universities networks may provide interesting opportunities.[25]

**Inter country, inter actor type mobility**

Next to the traditional forms of transnational and international R&I cooperation schemes (with travel and subsistence funding included in a project budget for every actor involved)[26], it could be examined to which extent civil society organisations are involved in COST actions, and see to which degree COST actions are used to stimulate knowledge exchange and mobility of representatives of civil society organisations within the context of knowledge exchange (mostly absorption) in view of co-design or co-creation processes. Usually, well established stakeholder organisations are able to cover the costs[27] of international knowledge exchange events. For many smaller (and more local) not for profit civil society organisations however, this is out of their reach[28]. On the COST web site this possibility is mentioned, but in the context of S&T cooperation. It is unclear if processes of co-design, co-creation and stakeholder involvement in general are eligible too. More promotion for this support channel may be needed to increase participation from enterprises, administrations and civil society organisations (backed up by an increased budget by the COST countries – as it is a co-funded programme. Specifically students from outside the EU encounter important (local) obstacles when looking for a job in the host country after graduation.

**Intra country, inter actor type mobility**

EU MS/ACs could put in place more incentives for cross sectoral mobility. More industry internships could be offered to PhD students, and PhD curricula could be modified to allow students to become involved in such internships. Some public administrations and NGOs also offer opportunities for internships (usually to master students). It could be examined if internships or short term secondments for people working in industry would be worthwhile. Similar secondments or internships could be set up with in administrations for members of civil society organisations. Of course, safeguards must be ensured against industrial lobbying, espionage and political influences. Citizen scientists and citizens involved in open innovation processes can shape the interaction and knowledge exchange between civil society and academia and industry respectively. In some administrations, civil servants can subscribe to internships in industry. It could be examined whether civil servants could be seconded for a limited period to civil society organisations.

More grant schemes could be set up for industrial PhDs and to support PhDs (PhD students) in exploiting their research findings by setting up their own, new company (university spin-off), or by having their ideas developed by an already existing company. Similar grant types could be designed to create societal

[25] See also "SWG HRM Contribution to the discussions on links between the EHEA and ERA WK 10870/2019 INIT.

[26] In Horizon 2020, there is Eurostars and its possible successor in Horizon Europe "Innovative SMEs". Also non framework programme industry specific programmes exist such as EUREKA, IraSME, Cornet.

[27] Thanks to fundraising and/or membership fees.

[28] E.g., occasionally, high profile/level think tanks are able to lobby for network support funding.

innovations (social entrepreneurship) or to allow researchers who are not officially active in academia to obtain a PhD in cooperation with a university.[29]

**Intra country, intra actor type mobility**
We consider this to be the more "regular" type of mobility on the job market where knowledge spill overs occur by employees moving from one employer to another, usually staying in the same sector or with the same type of actor. Individuals acquire experience and knowledge thanks to on the job training, life-long learning activities (up-skill) or career shifts (reskill), or even free time activities (e.g. as a citizen scientist). This is largely how the local job market functions (e.g., the recognition of acquired competencies next to formal diplomas). A highly important aspect here is that teachers, professors and professional trainers integrate the latest consolidated state of the art and technologies in their teaching and training activities.

### 5.2.3 Knowledge-based organisations

R&I organisations are populated by individuals who work with knowledge for a certain purpose[30], depending on the type of organisation and who offer as well as demand knowledge. As there are too many possible combinations of EKA elements (actor type, knowledge function, knowledge dimension) to be exhaustively treated in this position paper, we limit ourselves to mentioning some key ideas of what R&I organisations could provide for (offer) and would need (demand) in an R&I ecosystem.

**Co-creation**

*Academia*[31]

| | |
|---|---|
| Offer: | Improving and adding to the state of the scientific art on a variety of research topics (including research itself, education and training, and R&I policy) |
| Demand: | Stable and adequate supportive framework conditions (i.a. (long term) funding in a well balanced repartition between curiosity driven vs. targeted research and fundamental vs. basic vs. applied vs. application oriented research).<br>Sufficient availability of skilled research staff |

*Industry*

| | |
|---|---|
| Offer: | Innovations (products, services, business models, processes) on the market (including products, services, etc. directly relevant for the functioning of the EKA, such as consultancy, publishing channels, and training courses<br>(International) industry standards |
| Demand: | Skilled and productive workforce<br>Stable and adequate supportive framework conditions (i.a. funding and financial instruments) and rule of law (e.g., IPR) |

*Government*

| | |
|---|---|
| Offer: | Stable framework conditions<br>Funding & financial instruments<br>Rule of law<br>Specific policy relevant knowledge (through public scientific institutes) |
| Demand: | Policy relevant knowledge<br>Skilled civil servants<br>Input and output legitimacy[32] |

*Civil society*

| | |
|---|---|
| Offer: | Articulation of [citizens] demands and ideas<br>Opinion influencing and stakeholder approval/rejection<br>Availability for participatory processes |

[29] In theory, this is probably already possible in most of the EU MS/ACs, but might be insufficiently known.

[30] Usually summarised in the mission statement of the organisation.

[31] Comprising regular universities, universities of applied sciences and other knowledge institutions

[32] Cf. W. Boon & J. Edler, "Demand, challenges, and innovation. Making sense of new trends in innovation policy". Science and Public Policy, 45 (4), 2018, pp. 435-447

Demand: Free access to knowledge
Participation in decision making processes
Transparency of decision making processes

**Circulation/dissemination**

*Academia*

Offer: Libraries, open access paper and data repositories, lectures, presentations, speeches, (science) outreach activities
Curricula and teaching activities to deliver well educated/skilled graduates
Portfolio of professional life long learning/training activities
Technology transfer offices, outreach activities towards companies,
Patent applications, license agreements, valorisation agreements

Demand: Stable and adequate supportive framework conditions (i.a. funding for libraries/repositories, fast internet, teaching and training activities, journal subscription fees and article processing costs)
(International) exchange of teaching staff
Funding for teaching activities of academic staff, including adequate didactic material and infrastructure

*Industry*

Offer: Industry fairs, technology summits, presentations, demonstrations, consultancy, training courses and materials
License agreements
Patent applications

Demand: Availability of new, disruptive knowledge - even if restricted or licensed
Well skilled, experienced and productive workforce knowledgeable of recent technology
Well functioning IPR system (rule of law, support for patent applications)

*Government*

Offer: Open public data repositories, national patent office
Funding, financial and other supporting instruments (intermediaries, match-makers, open science/innovation platforms, data exchange platforms)
Stable and consistent framework conditions

Demand: (Evidence based) input and advice for policy preparation

*Civil society*

Offer: Crowd wisdom, citizens scientists, user innovators, crowd sourcing in general

Demand: (Free) access to open knowledge/technology sources with the recent state of the art
"Customisation" of specialised knowledge for non specialists
Outreach and dissemination events or structures (science centre)
High quality education & vocational training programmes

**Absorption**

*Academia*

Offer: Close link between research and teaching activities
Certification and quality control (exams, grades and degrees) of acquired knowledge
Doctoral training (including on research methodology and RRI)

Demand: Access to scholars, conferences, papers, data
Funding for membership fees to paper and repositories,

*Industry*

Offer: Training on the job, acquisition of professional, competencies, consultancy

Demand: Skilled workforce
Appropriate mix of supporting instruments for life long learning

*Government*

Offer: Appropriate and stable framework conditions
Acceptance and certification of acquired competencies
Innovation vouchers or other support for access to consultancy

Demand: Well skilled workforce
Availability of high quality consultancy, adequate training courses

*Civil society*

Offer: Well organised civil society organisations
Citizens eager to engage and learn

Demand: Free and easy access to knowledge (also understandable for non specialists)

**Application**

*Academia*

Offer: Teaching curricula, training material, teaching methods, research methods
Deliver what are called "services to society" (including policy advice)
create new spin-offs

Demand: Articulated demands and challenges
Stable and supportive framework/conditions to operate within
Funding for access to research infrastructures

*Industry*

Offer: Innovative products, services, processes, business models
Training packages, experienced consultants

Demand: Stable and supportive framework/conditions to operate within
Market-driven and policy-led demand articulation

*Government*

Offer: Well-designed policies, adequate instrument mixes,
Adequate official monitoring and certification labs (e.g., quality of water, air, …)
Well performing public scientific institutes
Good framework conditions
Good internal functioning and services to society
Transparent consultation/concertation processes and (in)formal communication channels

Demand: Sources/communicators of citizens' and societal demands
Foresight capacity
Availability of high-quality consultancy

*Civil society*

Offer: ("Infrastructure" and object of) societal innovation on the ground (participants of living labs)
Follow-up of (and mobilising to express support for or protest against) the evolution and/or impacts of certain plans, initiatives, decisions, instruments in the policy area etc. (e.g., on genetically modified organisms, CRISPR technology, …) [input and output legitimacy]

Demand: Open mind and respect by the other quadruple helix members
Empowerment and active participation in transparent decision making processes

As mentioned earlier, the government has an additional function, or more precisely a meta-function, to fulfil, i.e., making sure that the EKA is properly implemented and functions adequately.

**Facilitation:**

*Government*

Offer: Provide the necessary multi-level governance framework conditions, in particular concertation platforms and all supporting aspects (adequate infrastructure,
Sufficiently skilled staff
Necessary means to operate
Knowledge of the functioning of the knowledge wheel, …) to facilitate
Progress monitoring, data collection (on the local level [monitoring ERA NAPs] as well as on the European level [= European Semester, ERA progress report]

Demand: Commitment by quadruple helix members to seriously participate in and contribute to the well functioning of the EKA on a (sub)national level in all its aspects, including self-critical meta-reflections on the functioning of the EKA
Sustained commitment and approval by political level to support the EKA

For many of the points mentioned above, a wide range of support mechanisms and instruments exists already, in particular to support academia and industry in their knowledge wheel functions. Many scholars study various aspects of how academia or industry are actually implementing these functions, and how

well they are doing this. In addition, several monitoring mechanisms are in place, from academic rankings to innovation scoreboards.

It is also quite clear on how a public administration should work (although its precise scope and role varies according to the ideological preferences of the governing political parties). The performance of governments in terms of R&I support is also reflected in rankings, progress reports, etc. (e.g., the European Semester). All these efforts must be continued.

However, when looking at the "civil society" actor, it is quite clear that the role of civil society is rather underdeveloped and deserves additional reflections on how to extend its role. Apparently, ten years after the creation of the quadruple helix concept, it is not yet widely applied yet in R&I policy thinking, which is still largely based on the triple helix concept[33].

## 5.3 EKA priorities

As it is impossible to list all possible topics, actions, initiatives, ideas etc. that could be undertaken in the context of the EKA vision, it is even more impossible to actually implement all these ideas or actions. Hence, a harsh selection must be made, in particular as the topics chosen must be relevant for all EU MS/ACs as well as the European Commission and present some sense of urgency or peculiar preference. Furthermore, from the on-set there should be a reasonable outlook on sustained political support from (by preference all) EU MS/ACs. From that perspective we are happy to keep the notion of "priority" as the term fits the purpose, namely a broad (and widely agreed upon) major and important topic that should be taken up first and that can encompass many smaller actions or activities, both on a (sub)national level and on the European level (whether only by the Commission or jointly with the MS/ACs).

An EKA priority involves R&I policy, directly affects the way how the knowledge wheel turns and/or how the actor types of the quadruple interact. An EKA priority aims at changes in the R&I ecosystem in the long run and can encompass various actions or activities ranging from studies and reflections[34] to changes in legislation or the creation of new support instruments and governing structures. EKA priorities may involve novel policy developments for which preliminary reflection and concertation is needed between the EU MS/ACs. Every five or so years, priorities can be revised, changed and dropped, or new ones can be selected.


**Figure 6: An EKA priority**

### 5.3.1 A new EKA priority

Our proposal for a completely new EKA priority would thus regard the when, how, and with which impact citizens and civil society organisations could be more involved in the EKA. It implies a shift towards a higher involvement of governance levels closer to the citizens and at the same time represents a challenge to translate and prioritise local citizens demands into appropriate R&I actions that also address global challenges. Careful attention must be paid not to duplicate or compete with the existing channels of a well-functioning parliamentary democracy. One could experiment with broad popular consultations on the questions and topics that move the hearts and minds of the citizens. A good example is the Dutch Science Agenda initiative, which has been repeated in Flanders. Similar initiatives could be undertaken in other EU MS/ACs, and would help to give visibility to R&I in general and the EKA in particular.

[33] About 25 years old.

[34] R&I content is only directly addressed in case of R&I for policy preparation, e.g., defining research projects on aspects of the EKA or on how the knowledge wheel functions.

### 5.3.2 The current ERA priorities

Pending a positive evaluation, for the ERA priorities to become EKA priories, they need to be redefined in such a way that they address both research and innovation, not solely research nor research and innovation separately nor only in wording.

Logically the ERA priorities on "mobility" (open labour market for researchers cf. section 5.4) and the one on "optimal circulation and transfer of scientific knowledge" should be maintained (or only slightly redefined) as the free circulation of knowledge is their core element

The two ERA priorities most closely linked to the framework programme, namely "jointly addressing grand challenges" and "research infrastructures" for which the EU MS/ACs engage in partnerships with each other with or without the Commission, are now in a quite operational status. As such they would no longer qualify by default for an EKA priority.[35] The European Strategic Forum for Research Infrastructures and the upcoming Forum for R&I Partnerships (FRIP) have well designed processes and structures for EU MS/ACs and the Commission to cooperate in setting up joint programmes and common infrastructures. We would therefore consider them as jointly managed **EKA instruments**, albeit with proper governance structures (cf. section 5.4), which must be maintained.

The content of a future EKA priority on "effective national "knowledge systems" should include first and foremost the overall "management and follow-up" of the evolution of the EKA but needs to be centred less on major changes in national R&I systems for the sake of the EKA from a top down perspective. Knowledge exchange activities, such as the current Mutual Learning Exercises can stimulate this. Changes should be the logical consequence of evidence that brings governments to take measures for the benefit of their country out of self-interest. E.g., the research actors ask for 3Fs: funding, (academic) freedom and favourable framework conditions.

In this text we refrain from further comments on other ERA priorities as an assessment is foreseen in the future.

## 5.4 ERA actions, instruments and governance structures

As ERA priorities concern a rather broad policy topic and related strategic goals (as the current ERA priorities), operational goals, specific targeted actions possibly with specific instruments and related governance structures have to be set up to achieve results. Some of these actions will be executed by the Commission. E.g., the Resaver pension plan is a legal initiative taken by the Commission to support the mobility of researchers in academia and enterprises. Just as is currently the case, individual MS/ACs have to draft a national action plan (possibly consisting of subnational plans) as every MS/AC has a different local context. In addition, some initiatives (that can be linked to the current ERA priorities 2A, the new Forum for R&I Partnerships, and 2B - ESFRI) require a joint governance structure to monitor and steer the operations on the ground. Even for these joint EKA instruments it is to be expected that specific actions are to be taken by individual countries, which can be included in their national action plans.

[35] This is not a negative quality assessment. But as this priority is now relatively well established and functioning, there is no urgent need any more to regard this as a priority, but rather as a "regular point of attention".

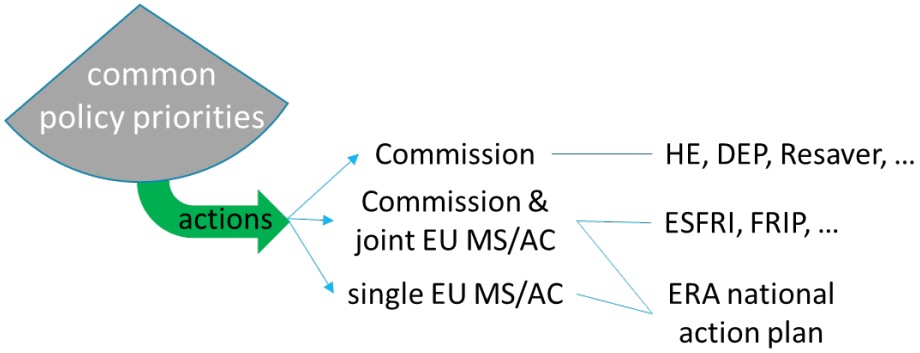


**Figure 7: Priorities are translated into (policy) actions, instruments and structures**

### 5.4.1 Some suggestions for actions for an EKA priority on mobility

Mobility of researchers not only concerns short or medium term exchange programmes, but inevitably also touches upon longer term career possibilities for researchers in their own country and abroad. This includes a range of topics such as tenure track, portable pensions, "open access" to published vacancies, visa procedures and work permits, transparency of selection and promotion procedures, equal opportunities (and wages) for men and women, and attractivity of research careers (avoiding (too) short term contracts with bench fees). Many of them are covered by the concept of "open transparent and merit based recruitment" (OTM-R). However, instead of simply becoming a "box ticking" exercise, OTM-R should become a central part of an overall EU HR policy for researchers that covers the "person dimension" of the EKA and is translated into specific policy and instrument mix recommendations, overall quality labels, etc. to be adopted by organisations in function of their actor type in the quadruple helix. As the EKA also covers researchers active in industry, government administrations, foundation and other not for profit organisations, it should be examined if (and how) elements of the EU HR policy for (academic) researchers can be adapted into policy for the researchers in non-academic organisations (e.g., exchange programmes, support for secondments, ...).

Apart from the existing Erasmus (for *students*) and Erasmus for Young *Entrepreneurs*[36] (COSME programme) programme that support applicants who want to broaden their horizon, no similar programmes are in place for civil servants (also local administrations) nor for representatives of civil society organisations. EU MS/ACs could support their *civil servants* to apply for internships in administrations in other EU MS/ACs and create in their own administrations a "space" for internships for applicants from foreign administrations. Alternatively a summer school like multiple day Mutual Learning Exercise could be organised with the aim of introducing to civil servants the latest theoretical developments in and practical consequences of (EU) R&I policy making. These initiatives could be organised in a "co-programmed" fashion, with the Commission covering the costs of the "knowledge" on offer and the MS/ACs of the "demand" costs (i.e. travel and subsistence and the (paid) time spent by the participants).

In order to optimise various co-creation and co-design processes for the Horizon Europe missions, one could think of sessions targeting (selected) *civil society organisations* involved in the various national (concertation) processes with the aim of preparing/training them for such processes. Alternatively, civil servants could learn how to interact with civil society and handle its input.

### 5.4.2 Governance of EKA

Abstraction made of the ERA governance review which will be carried out within about two years on the performance and future of the various ERA related groups, we nevertheless want to convey our thoughts

[36] One also could examine whether the current scope of "young" entrepreneurs might be widened.

on a future governance structure. As already mentioned, we consider ESFRI and FRIP as operational governance structures that manage roadmaps, monitor progress of projects and infrastructures etc. As such, these committees are important but should no longer qualify "by default" as EKA priority managing groups[37]. In fact, the only real official EKA related group is the ERAC, or rather the future "SCEKA (the Strategic Committee for the European Knowledge Area)". It is the "SCEKA" where EKA priorities are discussed and selected following a transparent and well-defined process and where standing working groups (SWG) are set up that handle a specific priority. Before an SWG can be created, an ad hoc working group is created to carry out preparatory work, and in particular to show whether or not a SWG is needed, and if MS/ACs are willing to bear the costs (travel and subsistence, and time of collaborators) of the SWG.[38]

A SWG can result in the set-up of joint instruments with sound governing structures that are responsible for managing, monitoring, assessing, etc the proper functioning of the instrument. As such, these governing structures should (also or at least) report to the SCEKA and the originating SWG. The various SWGs take the necessary initiatives and adopt a work programme that clearly states the goals, expected output, outcomes, impact and related RACER[39] performance indicators, intervention logic and timing of the actions that support their priority. The life span and scope of SWG can vary accordingly, and a SWG can set its own frequency and manner of meeting. Reporting is done via the SCEKA steering board (as currently is the case with the ERA steering board).

However, a joint instrument (and its governing structure) can "outlive" its originating SWG if the topic is no longer considered to be a priority, whereas the EKA instrument is still seen as relevant for the well-functioning of the EKA. Every five years, the SWGs and specific governing structures undergo an assessment or more formal evaluation under the auspices of the SCEKA.

The current process of defining and monitoring the national action plans (NAP) through the ERA related groups should be done more stringently, in particular regarding the number of countries participating in the ERA NAP monitoring exercise.[40] National priorities and actions can be defined using similar process as for the ERA priorities, although a common format (with obligatory information elements) is to be agreed upon and some quality control on the input should happen. To monitor the EKA activities, the current lightweight tool can be maintained and combined with the two-yearly ERA Progress Report by the Commission. It would be wise to re-instate the ERAC ad hoc working group on indicators to redefine the current and define additional indicators to cover (more) adequately the goals of the EKA priorities.

The SCEKA governance structure and monitoring processes resemble the current ERA governance structure and procedures quite closely as we consider it a waste of time to extensively debate (again) a new EKA governance structure designed from scratch (instead of discussing concrete actions)

### 5.4.3 ERA Lighthouses

From section 5.4.2, it already follows that the introduction of a new concept as proposed by the ERAC ad hoc working group, namely the "ERA lighthouse" is not our preferred option. Its definition is not yet crystal clear. An ERA lighthouse is proposed to be a: "*high priority collaborative strategic initiative about enhancing Framework Conditions for creating, disseminating or using knowledge in Europe or about launching initiatives of high political relevance in this context. The lighthouses should be developed in a co-design manner and implemented in a way that allows for larger impacts beyond those of earlier ERA-initiatives.*"[41] .

[37] Unless the SCEKA members consider that a substantial number of policy preparations and actions remain to be taken that warrant the current ERA priority 2 to be retained as an EKA priority.
[38] Meetings could be hosted by the Commission, Council or volunteering MS/AC.
[39] Relevant, Accepted, Credible, Easy (to monitor) and Robust
[40] ERAC Report on Monitoring ERA PRIORITIES WITH ERA ROADMAP National Action Plans (ERAC 212/19)
[41] Excerpt from recommendation 20 (WK10012/2019 INIT, draft working paper ERAC Ad Hoc WG on the Future of ERA).

In our view, an ERA (or EKA) lighthouse should definitely not be confusable with missions, JPIs or partnerships, and hence cannot cover "R&I content" in the sense of content being addressed or covered by the Horizon Europe Programme or JPIs. Therefore, the content of an EKA lighthouse can only cover R&I policy or other policies closely related to or also impacting on R&I policies. A lighthouse could be considered as a "policy actions only" version of a mission in the sense that a lighthouse should tackle well defined policy issues that nevertheless are quite visible for the R&I actor types. But then, except for the fancy name, what does an ERA lighthouse offer additionally compared to an ad hoc working group or a standing working group with a clear work plan with well defined objectives, intervention logic, expected impact and possibly a dissemination plan? It is not the change of name, but a clearly defined work plan, working method and commitment by the members of a group or committee that makes the difference.

But if ERA lighthouses were to be retained as a concept - which we currently do not wholeheartedly support - a good potential candidate topic would be "gender equality" and "gender in R&I". Although "gender" currently constitutes an ERA priority, we consider it neither a central nor a crucial element for the knowledge wheel to spin in a quadruple helix setting, but rather an element of the contextual "SDG layer" around the EKA.[42] Gender relates to labour policies, non-biased peer reviewing, access to project funding, equal career opportunities, international cooperation with certain third countries, etc. Hence, it is a good example of a horizontal issue that also involves regulatory issues (by governments) and household keeping items (internal organisational rules in academia and industry) and it matches SDG 5. A lot of visible, measurable actions leading to tangible impact can be taken with regard to this topic (cf. also the actions listed in the various ERA priority NAPs). Other potential ERA lighthouses could be found by considering to which extent the SDGs that are not addressed by the future Horizon Europe programme would be relevant for the future ERA.

Another option would be to use the "lighthouse" denomination as quality control label. Such a quality label could be awarded to a successful EKA action that has clearly attained its purposes; is quite visible and generates a considerable impact. But this is rather a PR operation. In general, we see no need for a pure "EKA PR label", as the average citizen cares much more for a practical solution to their problem than for the process, conditions or funding source that lead to the solution at hand (which is usually influenced by many different factors that at best can only be indirectly related to the ERA or EKA).

A third alternative could be to consider an ERA lighthouse basically as an extension to a Horizon Europe mutual learning exercise (MLE), in the sense that the participating countries promise to do their homework by implementing some of the recommendations put forward during the MLE. Potentially they could be joined by other countries (originally not participating in the MLE) if the topic and actions proposed by the MLE are believed important enough by the "SCEKA".

[42] Of course, this does not imply at all that we disagree with what "gender equality" and "gender in R&I" stand for contentwise.

# 6 Conclusion

We have proposed a renewed vision for a future ERA, or more precisely a future European Knowledge Area, by defining a conceptual architecture consisting of:

- Knowledge as the central element connecting research, innovation, education and training
- Four functions of the knowledge wheel: (co-)creation, circulation, absorption and application
- Four types of actors (quadruple helix): knowledge institutes, industry, civil society and government
- A contextualising layer: Sustainable Development Goals
- Three different dimensions of knowledge: embedded knowledge, knowledgeable individuals and knowledge-based institutions

Moreover, the EKA is built on several values (section 3) and according to various principles (section 4) that make the EKA typical of the European Union and its Member States and Associated Countries. Additionally, several suggestions for possible themes and topics to be taken up in the implementation of the EKA were sketched (although without aiming at exhaustivity or providing a complete overview) (section 5). We discussed the definition of EKA priorities, taking mobility as a prime example (cf. section 5.3) with related actions (cf. section 5.4.1), proposed a new one on interacting with civil society (cf. section 5.3.1) , and briefly discussed the current ERA priorities (cf. section 5.3.2). We drew an initial sketch of a governance structure (cf. section 5.4.2) and commented on the novel notion of "ERA Lighthouse" (cf. section 5.4.3), which we have redefined.

We position this Flemish position paper as an elaboration of the recommendations which were approved by the ERAC and are intended to enrich the on-going strategic debate in the various fora, and stress the fact that there are still many more items left for further discussions and elaborations.

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