# Strategic Research & Innovation Agenda 2016 - 2025

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JPI Climate

The JPI Climate Strategic Research Agenda (2011) was revised and updated by a Task Force under the mandate of the JPI Climate Governing Board. The current document has been approved by the JPI Climate Governing Board on May 2016.

**Suggested reference**
JPI Climate (2016). Strategic Research and Innovation Agenda. Joint Programming Initiative Connecting Climate Knowledge for Europe, Brussels, Belgium

*"We cannot solve our problems with the same thinking we used when we created them."*

**— Albert Einstein**

**The JPI Climate Governing Board would like to thank the members of the SRIA Update Task Force constituted by:** Kirsten Broch Mathisen, Gregor Laumann, Patrick Monfray, Antonio Navarra, Kevin Noone, Roger Street, Elisabeth Worliczek, and in particular Anja Skjoldborg Hansen, the Chair of the group, for bringing forward this important task for JPI Climate, in collaboration with the former Management Committee and the Transdisciplinary Advisory Board.

# Foreword

The COP21 in Paris in December 2015 reached a historic and ambitious agreement. The targets are challenging: to hold the increase of global average temperature to well below 2°C and pursue efforts to limit it to 1.5°C above pre-industrial levels. Furthermore, this is the first international agreement to put the need for climate adaptation on similar footing with the need for climate mitigation. It includes a long-term goal for adaptation and creates expectations that all countries will develop increasingly ambitious plans for national adaptation action over time.

Europe therefore faces the challenge to shift away from fossil fuels and to make the transition to clean energy, while continuing to strengthen its climate resilience. This momentum and ambition also presents new challenges to the wider realm of climate research, to provide the knowledge base needed to support this transition, in addition to adapting and preventing impending climate risks from months to decades and beyond.

New challenges need innovative solutions. The Joint Programming Initiative "Connecting Climate Knowledge for Europe" (JPI Climate) is a long-term pan-European intergovernmental initiative gathering European countries to jointly coordinate national climate research and fund new transnational research initiatives that provide useful climate knowledge and services for post-COP21 Climate Action. Accordingly, in 2016 JPI Climate revised its Strategic Research Agenda (SRA) that has guided its activities since 2011. The intention was to reflect recent developments, both in climate and climate-related research, as well as the knowledge requirements for the political and socio-economic environment. The new JPI Climate Strategic Research and Innovation Agenda 2016-2025 will contribute to the associated transition and responding future challenges.

The SRIA 2016-2025 is ambitious and addresses three complementary challenges, which range from understanding climatic processes to developing knowledge for decision making towards more sustainable societies. The SRIA 2016-2025 will be deployed via a focused Implementation Strategy and Plan (ISP) for the next 2-5 years. The translation of the SRIA will be carried under a new governance structure which includes the following:

- a Scoping Forum (SF) every two years, based on a series of scoping workshops to identify thematic priorities, as well as the most promising instruments to promote them via national and transnational activities;
- a series of Action Groups (AG) limited in time for operational implementation where appropriate, either at national, European or international levels.

It is worth to noting that both the SF and AG will use a strategic mechanism to connect people, problems and solutions in a systemic approach, involving in particular research performers, funders and stakeholders.

Finally, this SRIA will only be successful if the various actors are inspired by it to propose and participate in new projects and activities (incl. SC & AG). The SRIA will be an open process, going far beyond the inner circle of JPI Climate, by attracting a vast array of disciplines, from climate sciences to social sciences, and by interacting with diverse societal actors that will integrate climate constrain all types of decisions taken at all levels, be it the context of their work or in everyday life.

Patrick Monfray
Chair, JPI Climate Governing Board

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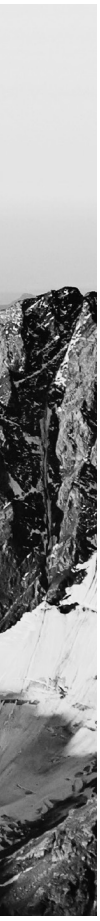
*"JPI Climate shall develop and coordinate a pan-European research programming platform"*

# JPI Climate Vision and Mission



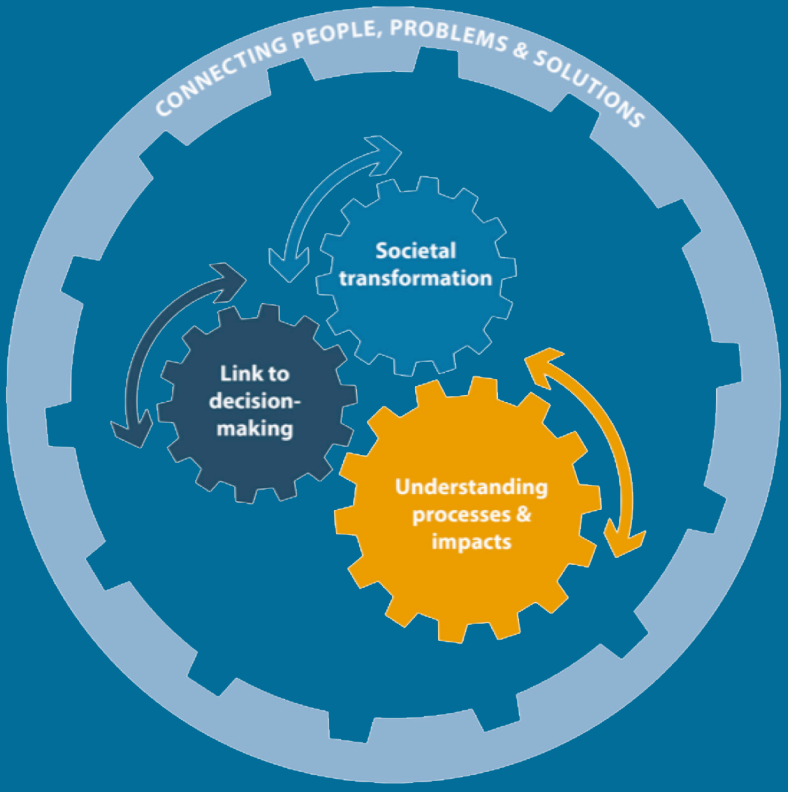
JPI Climate is a European Joint Programming Initiative of EU **Member States** and **Associated Countries**, in cooperation with the **European Commission.** JPI Climate, comprised of representatives of **ministries and organisations for research funding**, aims through its programme of activities to connect research, performers and funders **across Europe to** promote the **creation of new knowledge** in the natural and anthropogenic climate change domain that is **fundamental** and **relevant for decision support.**

The **vision** of JPI Climate is to actively inform and enable the transition to a low emission, climate resilient economy, society and environment that is aligned with Europe's long-term climate policy objectives. JPI Climate shall therefore **develop and coordinate a pan-European research programming platform** to provide useful climate knowledge and services for European and national climate strategies and plans and contributions to the UNFCCC and the UN Sustainable Development Goals.

JPI Climate's **mission** is to **align and inform strategies, instruments, resources and actors at national and European levels** by connecting the various research communities with research funders and performing organisations, within and across European countries, and beyond Europe.

We aim to:

- **foster** an excellent science base, world-class research infrastructures and a new generation of researchers;
- **cooperate** with partners in advanced, emerging and developing countries;
- **achieve** greater impacts through involvement of the public and private sectors in knowledge creation and mobilisation;
- **innovate** with the end-users on societal transformation for resilience and sustainability.


CONNECTING PEOPLE, PROBLEMS & SOLUTIONS
Societal transformation
Link to decision-making
Understanding processes & impacts

# Strategic focus areas

This Strategic Research and Innovation Agenda (SRIA) sets out **three overarching challenges and one strategic mechanism that together are intended to develop and support excellent, innovative, relevant and informative climate research.** The framing – especially the emphasis on connectivity and synergy - reflects the priorities and approaches of researchers, funders and practitioners in the countries participating in JPI Climate.

The three overarching challenges are:

- **Understanding the processes and consequences of climate change**
- **Improving knowledge on climate-related decision-making processes and measures**
- **Researching sustainable societal transformation in the context of climate change**

and the Strategic Mechanism is:
**Connecting people, problems and solutions in a systemic approach**

The **first challenge** deals with building the knowledge base on the climate system and climate impacts that is relevant for strategic planning. While the second challenge deals with the short-term/incremental decisions and understanding decision making processes themselves, the third challenge deals with decisions in a wider and more holistic perspective, in terms of the long-term transition and development of society. Together these three challenges deal with linking research and innovation to decisions at different scales.

The **strategic mechanism** frames the task of JPI Climate of enhancing connections as a research topic in itself. JPI Climate aims to work in an international context for all of these three challenges and strategic mechanism that comprise its SRIA, with a user-oriented approach and with a focus on integrating research and decision making.

**The slight overlap between the challenges is intentional.** Solutions to the complex problems associated with addressing climate variability and change will not be successfully developed within a siloed approach to research and innovation. These challenges are described in general terms, in order to account for future policy developments and frameworks as well as technical and scientific advances. The specific priorities and activities for a given period within JPI Climate will be reflected in the Implementation Strategy and Plan.

*"The JPI Climate Governance Principles: sustainability, stakeholder orientation, adaptability, transparency, and cost efficiency."*

# The Added Value of JPI Climate

At the European level, JPI Climate aims to foster the development of coherent research activities across its membership **whilst maintaining creative diversity.** It aims to facilitate cross-border interactions and enable a broader level of research and innovation. JPI Climate will help **ensure maximum impact from European research efforts** to respond to information and analysis needs that arise from the challenge of climate variability and change. In terms of process it will specifically contribute to:

**1. Enhanced societal relevance.**
JPI Climate´s multi-, inter-, and trans-disciplinary nature will consolidate, strengthen and amplify current climate research and its impacts, delivering usable knowledge for decision support at all levels across public, private or community sectors.

**2. Enhanced cooperation and alignment of research.**
Intensified cooperation between researchers from different countries, scientific traditions, disciplines and perspectives enhances innovation and scientific quality. Enhanced alignment of research should improve the efficiency and utility of research investments, including human resources and capacity.

**3. Long-term continuity.**
An international collaborative joint programming initiative over decades can transcend the limitations of short-term research programmes and projects, and provide more stability and continuity in research collaboration, essential considering the challenges society is facing.

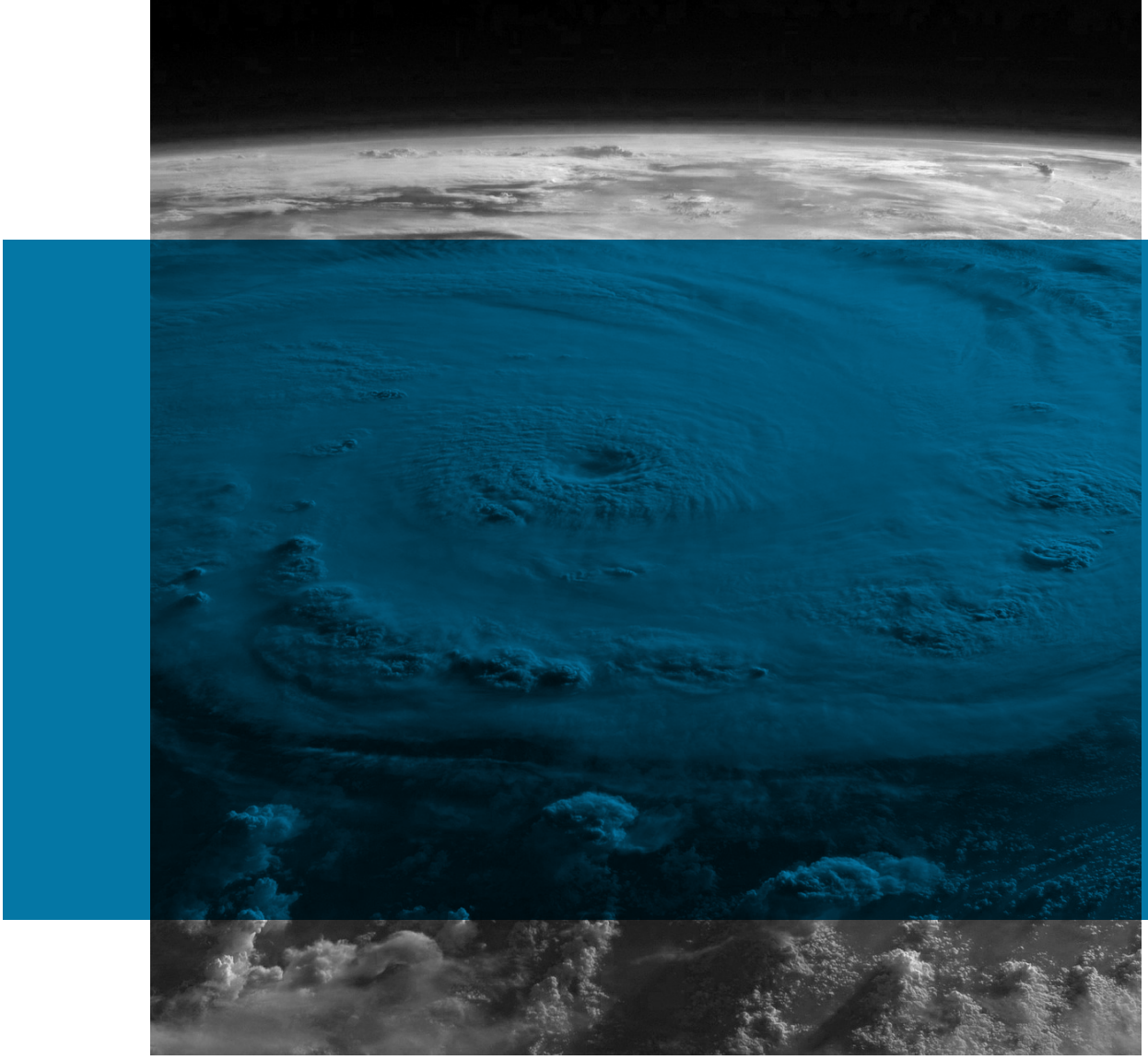
**4. Higher effectiveness.**
Transnational research collaboration avoids fragmentation and duplication of research, takes advantage of diversity and cultures, and can use resources more effectively, through national alignment or transnational support, by sharing and jointly developing new data from observational networks and modelling, experiments, tools, methods and research infrastructures.

**5. Stronger global position.**
A well-coordinated JPI Climate will provide a competitive edge in the global climate change science arena. By providing strong science support, it can also foster Europe's role in international climate policy development and enhance North-South research collaboration.

These five core value-added elements are to be seen in the context of **JPI Climate Governance Principles:** sustainability, stakeholder orientation, adaptability, transparency, and cost efficiency. It is also intended that the activities implemented in response to this SRIA will draw upon the **JPI Climate's guidelines on Open Access and Open Knowledge.**

We also already have concrete examples illustrating the added value of JPI Climate, such as the Call for Transnational Collaborative Research Projects on Societal Transformation in the Face of Climate Change and Russian Arctic & Boreal Systems; the Call for Climate Services Collaborative Research action on Climate Predictability and Inter-regional Linkages together with the Belmont Forum, and the ERA-NET Cofund for Climate Services (ERA4CS).

# The three main challenges of JPI Climate



# *CHALLENGE 1*

# Understanding the processes and consequences of climate change

## Aim

Understanding the processes that drive climate variability and change – physical, chemical, biological, and societal – is a necessary basis for developing strategies to mitigate and adapt to a changing climate. The aim of this challenge is to **develop a deeper process-level understanding of the multiple drivers and interconnected consequences of climate change** – and to do so with an explicit focus on making new knowledge useful for decision support and innovation.

# CHALLENGE 1

## Activities

This challenge includes activities ranging from research projects focused on fundamental climate processes to understanding the interactions between climate, society and economies. Research should help society to address the impacts of climate variability and change (on timescales from seasons to centuries) through improved observations, more reliable and trustworthy climate projections and a better understanding of processes and impacts (direct and indirect) on the Earth System. This challenge also focuses on understanding the connections between natural and human systems which are critical for addressing climate change. The degree of multi-, inter- or transdisciplinarity of the projects that JPI Climate will seek to implement will be determined by the nature of the questions being addressed and of the desired impacts of the individual project.

Activities under this challenge should ultimately help society to address **current and future climate variability and environmental change** through a better understanding of processes, trends, potential impacts and response options in order to prevent or limit climate-related risks (economic, social and ecological) while at the same time addressing other challenges and opportunities. Results from activities supported through this challenge should help us to adapt to the impacts of climate which are now unavoidable, or better anticipate and prepare for those that can be avoided. Research aimed at quantifying, reducing and effectively communicating the estimated uncertainty in our knowledge of the climate system is also an appropriate activity.

Further, this challenge also focuses on understanding the connections and interdependencies between natural and human systems critical for dealing with climate change.

## Role of JPI Climate

JPI Climate will strive to promote and define visible flagship activities in those areas where it can add value to existing initiatives through its institutional strength as a transnational platform of research funding organisations (RFOs) and research performing organisations (RPOs), and where it can mobilise national research communities from natural sciences to social sciences and humanities across Europe. JPI Climate will also aim to enhance the effective use of existing infrastructures for research, modelling and observation, as well as a better coordination of new infrastructure development. Beyond providing transnational research funding opportunities, it can foster comparison of ideas and approaches from across disciplines, regions and sectors in Europe and beyond, including emerging and developing countries, to identify best practices, which can be further developed, compared, strengthened and applied to yield potentials for mutual learning and new wave of innovations.


# *CHALLENGE 2*

# Improving knowledge on climate-related decision-making processes and measures

## Aim

JPI Climate aims to support society in mitigating, adapting to and reducing risk, to current and near future climate variability and change (typically from months to decades), through **better informing decision-making as part of pathways to sustainability** (see challenge 3) in the context of a variable and changing climate.

## Activities

Activities addressing this challenge are intended to produce the knowledge and evidence needed at different spatial and governance scales and to provide a better understanding of the use of this knowledge in mitigation, adaptation and resilience decision-making. The activities should also recognise the related nature and potential synergies in risk reduction for climate change and sustainable development.

In identifying and developing these activities, the overarching requirement is that they are the result of a deep and differentiated understanding of societal needs and the potential benefits to be delivered for decisions to address a changing climate with distinct temporal and spatial characteristics. Activities under this challenge necessarily comprise research and knowledge exchange into the efficacy or mismatching of different

decision-making framings and processes at and across spatial scales (from local to global), time scales and sectors in

the context of addressing the issues associated with a changing climate. These include research and innovation aimed at informing the effective use of uncertainties in decision making, including communications of the resulting decisions. In addition, these activities should include evaluation, assessment and quality control of the resulting decisions, climate policies and climate actions in delivering the required outcomes in terms of addressing climate change, including an understanding of their unintended consequences (positive and/or negative). Such reflexive approaches should trigger new waves of innovation, in particular in the field of decision-making, governance, norms, insurance and legislation related to risk reduction and resilient adaptation.

## Role of JPI Climate

A particular focus of JPI Climate is supporting the development of effective, innovative, relevant and high quality knowledge and information, including through research and other activities (e.g. supporting the development in a broad sense of climate services where the focus is on linking users' needs to climate knowledge). JPI Climate aims to play a fundamental role in facilitating and structuring interactions between excellent science and practice through implementing collaborative research programmes and other activities with a particular and demonstrable value for better informing policies and decisions.

A unique feature of JPI Climate in this context is its capacity to mobilise the breadth of relevant disciplines from across and beyond the wider climate change research communities to provide systemic knowledge and information relevant for various contexts within and across sectors. Activities explicitly addressing the social and economic sciences and the humanities are considered a gap in climate change research, so JPI Climate will continue its efforts to mobilise these disciplines.

The activities comprising this challenge address the link of methodologies and approaches of the natural and social sciences and humanities including behavioural sciences, as well as those of professional associations and groups in a structured and trans-disciplinary way. As such, success will require that activities connect researchers and other experts across disciplines and perspectives in a solution-oriented manner. In addition, a critical requirement is connecting with those making decisions (e.g. through existing networks), as well as engaging others supporting decision makers (e.g. other JPIs with interests in addressing climate change) or others that have explored or are exploring knowledge and evidence needs and possibilities, and the efficacy of decision-making. The latter includes working internationally with those funding and undertaking related research and knowledge exchange activities, including with emerging and developing countries.
These connections will be instrumental in identifying and effectively understanding and addressing the activities that should be part of this challenge (including through targeted and joint activities), in monitoring and evaluating the results of these activities from the perspective of the intended audiences, and in disseminating the results with the aim of maximising the effectiveness of innovative measures.

# *CHALLENGE 3*

## Researching sustainable societal transformation in the context of climate change

### Aim

JPI Climate aims to provide the knowledge and guidance needed by society to respond effectively to the long-term challenges of climate change, while also considering the implications (positive and/or negative) for the other global challenges that society faces. In order to achieve this, it is necessary to prudently **frame the climate change issue in the context of a larger sustainability agenda** and in conjunction with other socio-economic, environmental, cultural, equity and geopolitical goals.

## Activities

This challenge is about exploring, assessing and evaluating innovative solutions for climate change mitigation and adaptation in the broader context of integrated pathways toward a sustainable Europe, as well as research on transformation processes themselves.

Climate change and transformation towards a climate-friendly and climate-resilient Europe take place in a multifaceted socio-cultural context. Sustainability objectives need to meet the diverse people's visions and needs, thus research and other activities undertaken should reflect and investigate actors' diverging interest, values and resources. Especially within this challenge, there is a need for reflexivity of research, by carefully considering the use of concepts and underlying paradigms as well as considering the dimensions of transformation that are not explicitly linked to climate change research. Research topics include understanding processes and pathways through which positive transformations may take place and understanding the feedback loops between different levels (e.g. bottom-up vs. top-down, local vs. global) and different time frames (short term vs. long term) and magnitude (incremental vs. transformational). Activities in this area also investigate the barriers and enablers for transformation, including cultural and institutional lock-in, the roles of the finance, politics, "bottom-up" movements from communities and organisations, migration and conflicts. They also explore the roles effective communication and capacity building can play in enabling societal transformation.

This challenge requires approaching knowledge generation, exchange, and innovation in a multi-, inter- and trans-disciplinary manner, drawing on input beyond the wider climate change research community. JPI Climate activities will draw in particular upon the results of the JPI Scoping process 'Societal transformation in the face of Climate Change'.

## The role of JPI Climate

Within this challenge JPI Climate aims to foster processes and encourage research that goes beyond disciplines and climate alone, and look for innovative research activities and practices.

JPI Climate can add value here through shaping and facilitating research to service sectoral (if not yet developed by another initiative) or regional information needs, but also identifying in particular cross- sectoral and/or inter-regional interactions and interdependencies.

Furthermore, JPI Climate will aim to play a key role in linking research on adaptation and on mitigation with the 2030 Sustainable Development Goal on Climate and addressing connectivity of development pathways across and beyond Europe, in particular emerging and developing countries. Such inter-linkages need to be explored, assessed and evaluated across scales and objectives.
JPI Climate will make a difference by providing unique opportunities and a transnational space of interaction between communities of researchers and practitioners that would otherwise not necessarily engage. Unlike other sector oriented JPIs, it supports and informs their efforts while offering a unique forum to recognise and bring together the various existing expertise and knowledge (across sectors and disciplines), as well as decision-making focus. It targets sharing practical experience and expertise across many boundaries and will contribute to a common framing of successful transformation to sustainability.

# JPI Climate's STRATEGIC MECHANISM

## Connecting people, problems and solutions in a systemic approach

### Aim

Systemically connecting people, problems and solutions is essential if JPI Climate is to achieve its vision of actively informing and enabling the transition to a low emission, climate resilient economy, society and environment. This Strategic Mechanism aims to move climate change science forward in all fields, by enhancing connectivity between currently fragmented or disparate realms of climate change research and innovation, creating a **better understanding of the interlinkages and relationships** across this highly complex landscape, and creating living forums in which climate research and innovation can be enhanced and advanced.

This strategic, cross-cutting mechanism is also the way in which JPI Climate will operationalize its framing principles:

- A reflexive approach to climate change itself and attention to the way in which it is framed;
- Self-reflection on knowledge itself;
- Investigation that explicitly considers policy and decision processes in their framing.

Through this strategic mechanism, we will engage researchers and stakeholders in a reflexive, iterative and consistent manner. Doing so will both improve the quality of the research and innovation promoted by JPI Climate, and enable the mobilisation of results from activities so that they are useful and available to support decision making. The aspect of "connection" should be a transversal selection criterion in JPI Climate's activities and would promote activities within and between the three challenges.

# JPI Climate's STRATEGIC MECHANISM

## Activities

JPI Climate will convene regular forums in which researchers, practitioners and other stakeholders can engage. We will create and sustain a safe, authoritative and repeated space in which to co-create better research and help transition research results into decision support. In doing so, JPI Climate will be actively seeking to explore and share learning about the trans-disciplinary research process itself.

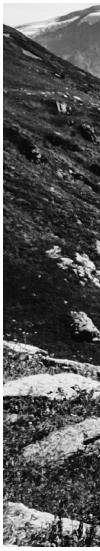
JPI Climate aims to facilitate increased interaction and connection of researchers working with conceptual, narrative or observational approaches, tools and models. This focus helps to track complex interrelations between social and natural systems and to understand the underlying forces and interdependencies driving systems' dynamics, as well as to envision scenarios and trajectories into the future. We will facilitate joint problem solving in cross-sectoral areas like climate resilience and disaster risk reduction.

To do so, the member countries of JPI Climate commit to investing in understanding the underlying structures, barriers and enablers in the European climate change research system. This includes the use of a large variety of incentives from transnational calls to national alignment and smart specialisation, involving both RFOs and RPOs. Dedicated actions will be identified and implemented to fill the knowledge gaps on how to link different data, models, trends, impacts, risks and response actions, stemming from all kinds of science, in order to develop a holistic understanding about the mechanisms in place in the climate change research community.

Furthermore, to support these directions, JPI Climate will provide the space to experiment with innovation, where failure is seen as part of the innovative process and good practices are put into action in order to find new, creative ways to respond to challenges. The intention is to provide opportunities for intensive exchange between a diversity of researchers and stakeholders in specific areas to build trust and to address the needs of selected communities within the realm of climate change, but also to build the required trust; and for learning from other successful initiatives.

## The role of JPI Climate

Through this Strategic Mechanism, JPI Climate acts as an enabler of connections between different parts of the research community on the European level and beyond, while contributing to achieve results in JPI Climate's three challenges. There are many actors involved in European climate change research in one way or the other, and JPI Climate aims to improve its already very substantial knowledge of the concerned actors, mechanisms, developments and present limits. It can draw from the experience of interaction with existing initiatives and networks in this area and stays open to adapt and react to new developments in this highly complex landscape to reduce fragmentation. JPI Climate brings a platform of dialogue, including cross-sector and cross-regions. Over the years, JPI Climate has built a significant expertise in stakeholder interaction; drawing from this knowledge, JPI Climate aims to be a pioneer in exploring new ways of addressing their needs and requirements. We will seek synergies with mechanisms such as European Structural and Investment Funds and the European Regional Development Fund in the context of connecting climate research with regional strategies for dealing with climate variability and change.



# Definitions

Alignment: Alignment is the strategic approach taken by Member States to modify their national programmes, priorities or activities as a consequence of the adoption of joint research priorities in the context of Joint Programming with a view to implement changes to improve efficiency of investment in research at the level of Member States within the European Research Area.

Climate Change Research: Climate change research is used in its broad sense. It includes perspectives from natural to social sciences including behavioural sciences and the humanities to the degree they address and support an integrated understanding of climate change as physical, environmental, economic, political, social and cultural phenomenon, as well as of the barriers to actions and approaches to deal with climate change. It includes researching processes within the interactive physical, chemical and biological cycles of the Earth System that influence climate, as well as the technological, behavioural, cultural and societal processes that define human-climate interactions since millennia. While research on the effects of new technologies or mitigation policies on climate are included in the definition, research on the technologies themselves is not.

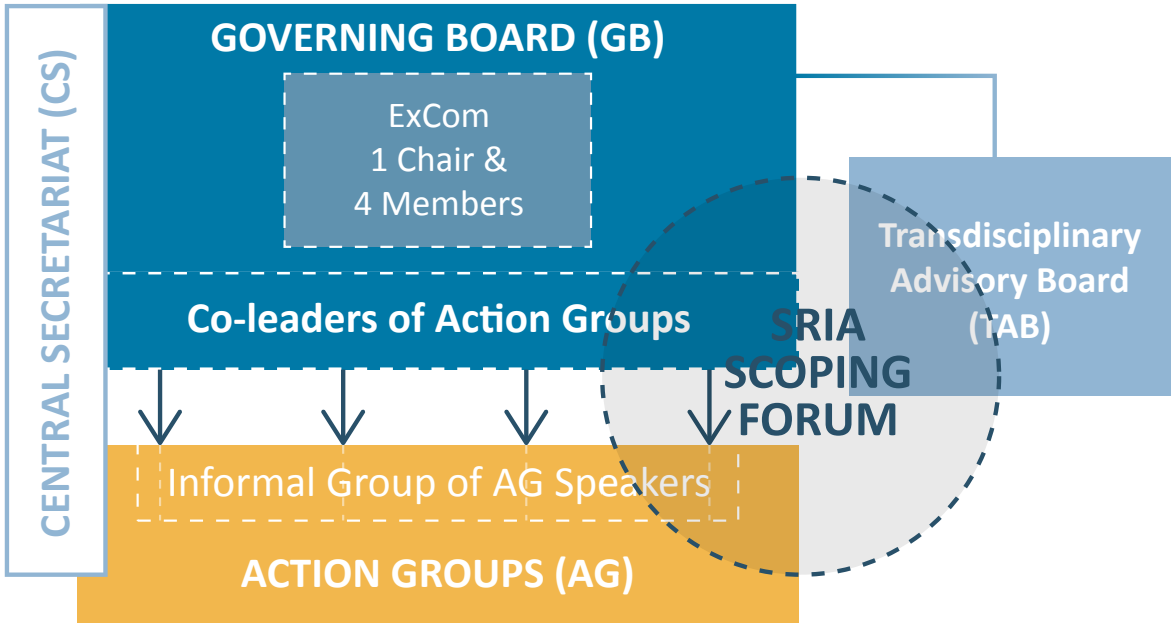
Decision making: The concept of 'decision-making' refers not only to policy making, business and investment planning in the broad sense, but also includes interactions between decision-making processes on different levels (EU, national, sub-national) and in different institutions, sectors and contexts. It includes also ex-ante and ex-post capacity to assess effectiveness, efficiency and efficacy of policies.

Innovation: For JPI Climate 'innovation' means 'societal innovation' at large referring to all strategies, efforts and interventions that could lead to the successful climate-friendly (through mitigation) and climate-resilient (through risk reduction and adaptation) development of European society and, at the same time, could eventually open up new and promising social and economic pathways. JPI Climate does not focus on engineering sciences and technologies, but societal innovation could trigger major challenges for them.

Societal transformation: The concept of societal transformation refers to societies' systemic changes and encompasses social, cultural, technological, political, economic and legal changes, and includes consideration of synergies and conflicts in terms of values, interests and views between the diverse actors of societies and the resulting trade-offs.

User: The term 'user' refers to actors from governmental organisations, business, NGOs and civil society operating on various levels that can be considered as the main stakeholders and addressees of the joint research and innovation facilitated by JPI Climate.

# Implementation of the Strategic Research and Innovation Agenda through the JPI Climate Governance




- **Governing Board:** All member countries are represented in the Governing Board (GB) by funding organisations relevant for JPI-related climate research. The role of the Governing Board is to guide overall strategic orientation. The Governing Board is supported by an Executive Committee that is responsible for overseeing the operational management of the JPI Action Groups.

- **Central Secretariat:** The overall coordination and day-to-day management of the initiative is supported by a Central Secretariat (CS). The CS is instructed by the GB, works closely with the Executive Committee and the JPI Climate Chair and reports to the GB. The GB elects an Executive Committee for a period of 2 years, renewable once.

- **Action Groups:** The Action Groups (AG) involve representatives of the JPI members and observers. They are appointed by the Governing Board and headed by up to two members and two additional countries that are interested in participating in the AG. Action Groups are in charge of the operational and programmatic activities of the JPI themes. They prepare working papers that are to be adopted by the Governing Board. Each Action Group has a spokesperson to the GB to represent the Action Group in the Executive Committee.

- **Transdisciplinary Advisory Board:** This board, consisting of national and international members from academia and from relevant stakeholder groups, advises the Governing Board on specific issues on request. This Transdisciplinary Advisory Board is an important instrument to involve relevant stakeholder groups.

- **SRIA Scoping Forum:** The SRIA Scoping Forum is organised every two years as a major exchange forum for researchers and stakeholders of different horizons, all invested in, relying on, or using climate change knowledge. The SRIA Scoping Forum is preceded by a series of scoping workshops and will build upon the outcomes of these workshops.

## Governance principles

- **Sustainability:** Taking into account the challenges of climate change in the activities of JPI Climate, based on active reflection of operations (e.g. 'green meetings') and formulating the endeavour of constant improvement of the operations climate performance
- **Stakeholder orientation:** Integrating knowledge, values and objectives of stakeholders in the implementation and operation of the JPI through the active participation of stakeholder group representatives
- **Adaptability:** Responding to novel scientific insights and research requirements and to exigencies coming from societal and ecological transformations
- **Transparency:** Fostering information and experience sharing; collaboration on the notions of openness, mutual learning, mutual dependency and joint creativity
- **Cost efficiency:** Limiting superfluous duplication of scientific/technical and funding activities

graphic design & layout / herenloebas.be

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