JOINT PROGRAMMING INITIATIVE

“Connecting Climate Knowledge for Europe”
(Clik'EU)

Joint proposal made by Austria, Finland, France, Germany, Italy, the Netherlands

Supported by Belgium, Denmark, Ireland, Norway, Portugal, Sweden, Turkey, and United Kingdom

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1. Theme for the Joint Programming Initiative

Europe has set ambitious goals in terms of climate change mitigation and adaptation. It has taken a lead role to reach a global agreement on the extraordinary efforts required to combat or avoid negative consequences of climate change. Whether these efforts will be fruitful depends on societal capabilities to effectively cope with the consequences of climate change.

Consequentially, considerations on climate change are becoming a critical parameter in decision-making on all levels, to be integrated into a complex framework of already existing policy, planning and management processes. There is growing recognition that well planned investments in climate mitigation and adaptation may also hold economic opportunities – particularly if compared to potential costs of inactivity. But reliable ways to assess and communicate costs and benefits or risks are not readily at hand. However, they will strongly affect to which extent societies, regional and local authorities, economies, or even companies accept paying for precautionary measures.

This JPI attempts to frame a vital contribution of science to establishing a learning community across the EU capable of developing a sustainable and adaptable Europe. It proposes a systemic approach that considers in conjunction the dynamics of natural and social systems that drive environmental changes, the interactions and feedbacks involved, and the risks and challenges to societies and their environments.

We propose "Connecting Climate Knowledge for Europe (Clik'EU)" as a fundamental European initiative concerning the coordination of climate research funding. We understand 'climate knowledge' in a rather broad sense, including all kinds of scientific knowledge on causes and consequences, on cost, risks and benefits of climate change as well as possible responses. Clik'EU intends to contribute to a highly coordinated knowledge development by not only improving the scientific expertise on climate change risks and adaptation options, but also by connecting that knowledge with decision-making on safety and major investments in climate-vulnerable sectors in Europe. The main aim is to empower European decision-makers to take appropriate action on climate change. To this end, Clik'EU will work together with other national and European institutions, not duplicating the work in other JPI's (e. g. Agriculture, UrbanEurope), but rather present the interface between knowledge and action at a European level. By the participation of several countries and the support of many others Clik'EU uses the framework of EU Joint Programming pre-eminently.

Overall structure

We suggest structuring this Joint Programming Initiative JPI along four major strands as interconnected, yet sufficiently distinct, core modules (see figure below). These imply an evident added value for European integration, because national activities alone clearly fall short of meeting the collective demand of knowledge.

(1) Moving towards climate predictions

In many cases the time horizon of investment or planning decisions spans but a fraction of the periods covered by many of the existing climate models and scenarios. Decadal timescales are of particular importance for planning and investment decisions as well as precautionary measures. It is open, whether or not predictability of climate is within reach. But climate science will fundamentally benefit from efforts into this direction. Seasonal to decadal predictions require substantial improvement in our understanding of key processes and enhancement of our ways of dealing with uncertainties in processes that are currently difficult to simulate. This relies on extensive analyses of climate phenomena from available observations, and testing models against these observations. This will allow basic insight into our ability to predict climatic conditions. A prerequisite for seasonal to decadal predictions is a global integrated observing system for initialisation and verification of predictions. Also, insight in current natural variability, including extremes, from observed records is essential.

(2) Research for climate service development

Consequences, probabilities and uncertainties related to climate change become increasingly relevant for decision-making processes on all scales. This highlights the importance of improved availability and accessible expertise regarding the use of quality climate information. It requires capable information systems and development of inter- and trans-disciplinary approaches and tools. These need to allow communicating the strengths and limitations of complex scientific findings on climate change in relation to practical questions and problems, qualifying stakeholders to deal with climate uncertainties without compromising their capacity to act.

(3) Understanding societal transformation under climate change

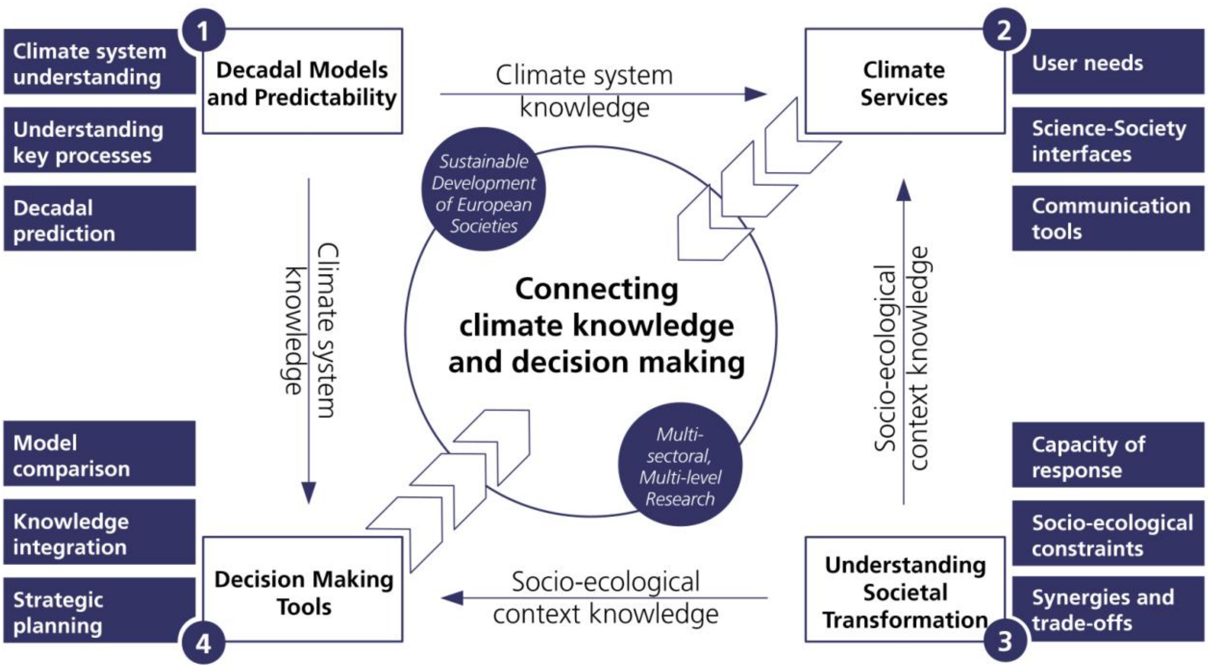
The growing body of knowledge on climate change, its causes and consequences is not matched by an equivalent understanding of the societal transformation necessary to confront climate change and develop sustainable and equitable lifestyles under liveable and save conditions. It will be essential to explore societal climate response strategies that are both feasible and not aggravating other problems. This implies also addressing the societal capacity to implement these response strategies. This will require consideration of such strategies in their systemic context and with an inter- and trans-disciplinary perspective.

(4) Improving models and scenarios tools for decision-making under climate change

Robust consideration of the impacts and consequences of decisions related to climate change requires reliable instruments on such as fully integrated scenarios, models and other assessment tools capitalizing on various sources of climate knowledge. Such instruments also need to take into account constraints not directly related to climate but imposed by societal or ecological systems. Their utility will depend on close interaction between researchers and stakeholders in order to assess key vulnerabilities, risks and opportunities for regions and industries, societies and economies and globally linked value chains.

Research framework

This JPI defines four modules which are designed to collectively provide critical knowledge supporting the emergence of a sustainable European society. They are connected in nontrivial ways; i. e. advances in each of these four areas are critical for progress in the other ones.



Conceptual framework of the JPI Clik'EU: Thematic fields and mutual contributions of the four modules

The first module addresses major gaps in our system understanding. Aiming for a European seasonal-to-decadal climate prediction system does not only set a challenging ambition level. It also inserts a structural orientation in fundamental climate research to deliver results of practical value that help assessing climate change on a crucial time scale for decision processes.

This orientation has a direct connection with the second module, aiming at advanced knowledge on the establishment of climate services. This implies that our challenge will not be limited to tailoring climate information to user needs. It will include exploring novel ways of interaction and consultations between scientific and non-scientific experts to allow climate information to be employed in strategic planning and decision-making on all levels.

A better understanding of societal transformation and decision processes, as conceptualized in module three, is a precondition for any such endeavour. Scientific research over the last decades has laid bare many interrelations between spatially, temporally or functionally distant parts of the earth system. They are connected to global value chains with flows of goods and services, people, capital and information and with changing lifestyles and consumption patterns that contribute in a multidimensional manner to social, economic and environmental dynamics at various scales.

Hence, the dynamics of biophysical systems need to be seen as functionally coupled to social or economic systems, just as natural dynamics constitute constraining factors for socio-economic developments. It has become imperative to better understand these many interrelations over different spatial and temporal scales. Consequentially, module four is devoted to the coupled study of socio-ecological phenomena, accentuating the considerable progress necessary in modelling and scenario development to move beyond conventional approaches to integration. Its major objective is the development of advanced integrated decision-making tools to support the systemic assessment of implications of strategic decisions taken in Europe. The formal representation of social systems is considered an important feature of these tools.

These are four, non-technological areas of climate-related research where Europe has a strong basis already. Progress in each of these areas is considered essential for a European research landscape, empowering stakeholders to define a vision of sustainable societies as well as respective development pathways in a systemic perspective. The research communities are already working in strong trans-boundary networks and many ongoing projects, initiatives and structures on member state as well as communal level will need to be considered to ensure effective allocation of resources. But at the same time this landscape offers a variety of self-evident starting points for implementation planning and the establishment of lasting cooperation structures within the European Research Area.

Each of the four topics mentioned above is explained in further detail below, proposing key topics to be addressed as part of a JPI.

2. PROPOSING GPC MEMBERS

Proposed by Austria, Finland, France, Germany, Italy and the Netherlands.

Supported by Belgium, Denmark, Ireland, Norway, Portugal, Sweden, Turkey, and United Kingdom.

3. OBJECTIVES

This JPI aims to deliver a sound and applicable set of knowledge based tools and instruments for decision-making under climate change. To this end, it makes a joint strategic investment into closing critical knowledge gaps in key areas of climate research and enhancing their structural orientation towards delivering results of practical value for policy, planning and investment decisions.

The *envisaged outcomes* are:

- A European decadal climate prediction system and enhanced system understanding, including extremes.
- Advanced knowledge on the establishment of climate services.
- Clear understanding of transformation strategies towards a sustainable European society.
- Advanced integrated decision-making tools for the systemic assessment of the implications of strategic decisions.

The *strategic objectives* of this JPI are:

- To establish structures for a long-term, strategic cooperation in climate research within the European Research Area, including provisions for regular revision and re-iterations.
- To achieve a competitive advantage for Europe by improving the base for oncoming international negotiations and enhancing decision-making capacities on various levels with regard to climate change.
- To enable the European society, through a systemic approach that considers the complexity of our social, economic and ecological systems, to cope with climate change and to take the responsibility of reducing negative consequences of climate change while maintaining or improving quality of life in a sustainable manner.

4. RESEARCH QUESTIONS BEING ADDRESSED

MODULE (1): MOVING TOWARDS CLIMATE PREDICTIONS

Key objectives

- Enhancing the scientific understanding on key processes, important mechanisms (e.g., small scale dynamics, cloud radiative forcing, aerosol-cloud interactions, ocean-atmosphere interactions, biogeochemical interactions and feedbacks), and system (in)stability, including trends for present and past climates, e.g., Atmosphere-Ocean-Coupling (North Atlantic) and Stratosphere-Troposphere interactions, land-surface-atmosphere interactions, teleconnections.
- Analysis of climate variability from seasonal to decadal time scales, the distribution of amplitude and frequencies of weather regimes, extreme climate events (droughts, heat waves, storms, floods, ...), the processes involved in their occurrence and persistence, through recent past climate archives and instrumental records.
- Analysis of seasonal to decadal climate predictability, its uncertainties and limitations in Europe and regions of interest for Europe, including understanding the physical processes that govern climate variability and developing methods for initialization, perturbation and verification of the seasonal to decadal prediction system, with observational data sets of key parts of the climate system (ocean, soil moisture, sea ice, aerosols...).
- Enabling advanced Earth system models to link observations and models via a better definition of the initial state or even via the method of data assimilation, and encourage long-term re-analyses.
- Simulation and downscaling efforts to get a better understanding of extreme weather conditions and allowing for much better defined scenarios encompassing more complex atmosphere-ocean-cryosphere-biosphere feedbacks than long-term climate simulations.

Based on the existing Earth System Models (ESM) we are able to estimate the amount of temperature increase over the next 100 years (mainly as function of different emissions-scenarios). These climate projections are based on mathematical representations of the climate system in numerical models and forced by assumptions of future emissions of greenhouse gases. There is increasing confidence that such models can represent the physical processes that are necessary for reliable simulations of future climate change.

Complexity and resolution of models increase with growing computer power and may shortly become capable to provide information on smaller-scale features, as changes in extreme weather events. Further improvements in regional-scale representation are expected. A large gap, however, exists between perspectives and timescales of weather forecasts and century-long climate projections, as provided by the IPCC-scenario climate simulations.

However, decision-makers are mostly requesting information on the so called decadal timescale corresponding to their specific planning horizons. Furthermore, predicted exceptional weather patterns for the forthcoming years or seasons (in terms of probability) might raise the awareness at which rate climate is actually changing, as a necessary precondition to put this change into a comprehensible perspective for societal actors and provide information for adaptation.

Thus, this module aims for a novel model approach to the challenge of developing a seasonal-to-decadal climate prediction system, which can provide reliable information on climate variability (including extremes) on 2-3 up to 30 years time scale. The focus will be on Europe but also on key regions of interest to European policy. It is open, whether or not predictability of climate is actually within reach. But climate science will fundamentally benefit from efforts into this direction through substantial improvement in the understanding of key processes and uncertainties as well as basic insight into our ability to predict climatic conditions. Current observations can be used to assess natural variability, including extremes. Ocean, sea ice, soil moisture and land cover observations are needed to initialize and verify the predictions.

Developing a European decadal climate prediction system is beyond capacities of individual nations. Best European skills, resources and facilities need to be engaged. By clever networking and common research strategies, individual nations and research organizations can provide meaningful contributions to this field and at the same time take full benefit of the joint efforts. This module will benefit from many existing networks and ongoing projects on communal (such as ENES, the European Network for Earth System modelling) or member state level. The main research directions of this module therefore imply a strategy for climate research, which includes supporting and making use of these existing endeavours, often centred at leading laboratories within Europe. To allow crystallization of qualitatively new efforts around these initiatives, new opportunities in simulation and measurement should be explored, e.g.:

- To advance the use of Peta- and Exa-scale computation to improve the simulation of small-scale processes, such as cloud resolving climate simulations at kilometre scale, and better account for the complexity of the system.
- To exploit the synergy from a new generation of satellite remote sensing (e.g., ESA – EarthCare), existing (and emerging) ground based observational networks (e.g., CloudNet, Fluxnet, ICOS, EURO-ARGO, ACTRIS, JERICO), and capacities for field experiments (e.g., research airplanes, vessels...) (e.g. IAGOS).
- To help existing institutional efforts to take larger steps that incorporate and leverage the energy and creativity of individual (often university based) research groups.
- To explore potentials for a strategy and implementation plan securing the efforts for long term observations and exploring potential for sharing of supercomputing resources.

Main research directions

(i) Developing seasonal to decadal climate system predictions

The predictability of climate changes is geographically much contrasted. The European climate is largely dominated by natural chaotic variations, which implicates higher uncertainties in predicting seasonal and inter-annual variations than it is the case e. g. in North America. On the decadal timescale, however, climate predictability may exist, for example due to the atmospheric coupling of European climate variations with the North Atlantic Ocean.

Therefore, dedicated initiatives will be developed to work towards the analysis and demonstration of European climate predictability, and to the development of a European decadal prediction system. A seasonal to decadal climate prediction system should improve our ability to take into account climate related trends (e.g., precipitation, wind and temperature distribution) and the modification of probability of occurrence of extreme weather events (floods, storms and heat waves). Also, tipping points with regard to major changes in circulation patterns may be assessed with more confidence. This is particularly important for decision processes related to adaptation and mitigation or integrated response strategies to climate change.

The actual potential or limitation of decadal predictability still has to be firmly established yet. Seasonal to decadal climate predictions require careful initialization of an earth system model using methodologies that are based on e.g. data assimilation techniques. Major uncertainties arise due to this initialization procedure from sparse data. Many key processes and feedback mechanisms that govern climate variability are also still lacking from the models due to gaps in scientific understanding or in the availability of detailed observations of some physical, chemical or biological processes. The most important model uncertainties in this respect are often related to resolution issues. This is especially the case with many important small-scale processes that cannot explicitly be represented because of model complexity and resolution and are approximated by simplifying parameterizations. Furthermore, scientific knowledge is also needed on non-linear behaviour of Earth system components in different temporal and spatial scales, particularly on system stability and resilience.

(ii) Enhancing understanding of key processes, feedbacks, and system (in)stability

As mentioned above, one of the main sources of model errors comes from the insufficient understanding of the key processes and system behaviour, and/or lack of detailed observations of some physical or biogeochemical processes important to climate system. Research is especially needed to understand physical, chemical and biological processes and feedback mechanisms which are relevant in seasonal to decadal time scales, making full use of various observational data sets (atmosphere, ocean, biosphere, cryosphere, instrumental records, paleorecords, etc.). In order to detect, attribute and predict anthropogenic effects on climate research is also crucially needed to understand the natural variability of the climate over time scales from years to decades or centuries from these data sets.

Therefore, this module will focus on climate processes that are currently difficult to model or key variables for which probabilistic projections cannot currently be provided**.** It will also aim to increase model resolution in order to be able to describe small-scale processes. Moreover, existing and future models require validation based on the analysis of remote sensing and in-situ observations and the design and establishment of appropriate feedback channels from application back to modelling (including validation criteria and processes that facilitate a systematic and transparent mode for continuous model improvement).

Similar uncertainties also remain on the long-term climate changes. Possible thresholds or tipping points may be reached depending on emission scenarios. Reaching a tipping point, such as Amazon or boreal forests dieback or large scale permafrost degassing of methane, would have serious consequences at all scales. Although considered with low probability, the associated risks are so high that they deserve more concern. Our knowledge on underlying biogeochemical and physical processes and their occurrence in the past climate history remains very limited. Model parameterizations of such processes are hardly available to include them in long-term projections under different scenarios of greenhouse gas emissions.

MODULE (2): RESEARCHING CLIMATE SERVICE DEVELOPMENT

Key objectives

- Initiating collaborative learning processes of providers of climate information and users from different sectors on needs and limitations on both sides.
- Setting up trans-national cooperation structures for the consolidation and integration of approaches and methodologies for climate service provision, with a special focus on cross-border and pan-European issues.
- Developing joint products, methodologies and standards where appropriate or necessary.
- Enhancing Europe-wide consistency and optimizing quality of climate services and information.
- Establishing systematic exchange of best practice.

The science community finds itself increasingly exposed to various groups of stakeholders asking rather specific questions about consequences, probabilities and uncertainties related to climate change. These clients are decision-makers and stakeholders from industrial and other private enterprise, various policy arenas and planning disciplines as well as highly trained scientists using the data for applied research.

Different categories of users or decision-makers are affected by the physical, ecological, economic or social consequences of climate change in very different ways. This corresponds to a wide scope of needs ranging from information on temperature, humidity, wind speed, and solar insolation relevant to e. g. building codes or user energy consumption to information relevant to control risks of hazards through extreme weather events, to communicate climate sensitive health or disease issues or to enable financial service providers to fulfil their tasks in the assumption of economic risks. Even within an individual sector, information requirements may differ significantly depending on the types of risks taken and time horizons considered.

Hence, many issues concerning climate services need to be resolved problem-oriented and in direct interaction with the stakeholders involved. The actual value of a service depends on a number of factors, including the strength and nature of the linkages between climate related events and the human reference activity as well as the nature of the uncertainties involved and the accessibility of credible and useful data.

Critical factors are the ability of users to interpret climate information and the capability of users and scientists to communicate about needs and limitations on both sides. Each method used to estimate future climatic conditions for specific regions and periods has its strengths and weaknesses, for instance due to particular underlying assumptions. These limitations are of great significance but usually they are neither transparent for the users nor sufficiently communicated and assessed. On the other hand, climate knowledge needed to answer the questions of a user is rather contextual. In many cases the complexity of model simulations makes it difficult to link them up to existing risk management and policy instruments.

Thus, relevant climate knowledge must not only be made available, but also contextualized and interpreted so that decision-makers are empowered to act upon this information. Scientists find themselves challenged to assist decision-makers in understanding the inherent uncertainty and picking the optimal tool for their needs (which could be climate projections but also more qualitative decision-making tools) as opposed to merely tailoring climate information to meet customer expectations. Usually this requires substantial consultations between scientific and non-scientific experts. Furthermore, interdisciplinary research is required to develop products more adapted to user needs, e.g. concerning health, ecosystems, urban areas etc.

Many member states are developing their own climate services capacity, sometimes even with multiple providers per country. Each provider is using an individual approach to service provision, even though all services are actually based largely on the same core information (climate models, climate observations, scenarios etc.). In this context the JPI aims to meet a structural demand across Europe for climate services corresponding to an overall need to respond to climate change on different spatial scales within the next decades. This is why this module is aiming at cooperation between countries within Europe, especially in cross-border issues, like river basin or coast line management. Encouraging or enhancing permanent cooperation will have added value over individual short term collaborative projects.

However, this initiative does not envision harmonizing approaches to setting up climate services. It is going to address the need for a certain degree of consistency of approaches in order to avoid duplication of efforts and potentially large differences in the quality and nature of information being provided from country to country. We also see that the provision of climate services does pose a number of genuine challenges regarding the scientific and methodological basis, the understanding of the role and limits of science and the exchange of best practice especially with respect to an active, two-way stakeholder dialogue.

Main research directions

(i) Understanding the customer side

Climate services afford the opportunity to transform scientist-stakeholder interactions from a one-way to a two-way interaction. Ideally, data would be prepared or even generated with the application in mind and appropriately put into perspective e. g. through user-driven scenario development. User-driven (or better: user-pulled) development of climate services requires a deeper understanding how decisions related to adaptation and mitigation are taken, including their local context.

It is essential, thus, to comprehend how decision-makers both in private and public sectors make use of e. g. scenarios and how climate information is processed, to make modelling and scenario output useful for concrete decisions and encourage appropriate use of it. How, for example, do users think about climate uncertainties and what role do e.g. probability functions play in their decision-making processes? How do they relate costs and benefits of concrete action to the probability of damage in their specific field of interest? This also includes analysis of different ways of framing and perceiving climate change.

Generally, it can be observed that stakeholders are more interested in the derived consequences and impacts from changes in climate. Thus the link with impact and adaptation research becomes pre-eminent as well as interfacing with other sources of information not directly related to climate change that needs to be made available as well for undertaking impact, adaptation, vulnerability and mitigation analysis. Even though national particularities may confine the room for generalization, there is considerable potential for mutually beneficial learning processes with an added value for initiatives such as the EUMETNET plans to develop European Climate Services through the European Climate Support Network, and for European climate policy development.

(ii) Survey of the supply side

There is a wealth of practice on how to organize participative scientific processes to ensure partaking of relevant stakeholders and allow results to meet their real concerns. This JPI will aim to assess and compare different approaches in the field of climate service development. In some areas, the development of standard methodologies may be useful, while in others the need for individual servicing may turn out to be dominant.

This will also include exploring novel approaches to the communication of the strengths and limitations of complex climate projections (e. g. probabilistic projections) and for awareness building on the complex inter-relations and feedbacks between societal transformation, individual decisions and climate dynamics. Finally, feedback processes from model users back into the scientific community will have to be duly considered, to communicate methodological demands and knowledge gaps identified while applying results.

An overview of best practice may be obtained by inductive and iterative inter-comparison of methodologies. It would aim to systematize and categorize experiences and to understand the differences as well as the strengths and weaknesses of various approaches. Information from this assessment will have to be made available in a systematic manner, allowing stakeholders accessing a range of available options when engaging in a science-practice dialogue.

(iii) Other potentials for co-operation

Delivering climate information to the society will also require interdisciplinary cooperation in order to provide information more adequate for user needs. Such cooperation may concern hydrological systems, ecosystems, health or urban areas, as it was clearly emphasized by the working groups of the World Climate Conference (WCC3) in Geneva. It may, for example, require the development of coupled modelling platforms to explore issues related to health, ecosystems or economy. Fostering interdisciplinary cooperation to address the challenge of climate services is a general issue that could benefit from shared developments and the identification of gaps provided by the investigation of user needs.

Further fields of cooperation in the area of climate services include, for example, cooperation on scientific and methodological connectivity. It is important to increase comparability and compatibility of climate data across national borders. There is potential in particular for more consistency in data formats, data storage and data provision, especially with regard to cross-border adaptation issues like water or coastal zone management.

Consistency also is an issue in the use of climate data, for instance in enhancing knowledge on best practises for e.g. providing information about future time series, dealing with specific uncertainties, or the establishment of operational links to impact models used in different sectors. Cooperation could also include methodological approaches (e.g. downscaling techniques or regional modelling).

Finally, there is room for cooperation on product development in order to match climate data (e.g. model and scenario output) to standard user requests. It will be important to coordinate how to relate the available data to the categories and other relevant variables of decision-making (e.g. investment cycles, strategic planning time spans, or index relations etc.).

MODULE (3): UNDERSTANDING SOCIETAL TRANSFORMATION UNDER CLIMATE CHANGE

Key objectives

- Initiating interdisciplinary research to enhance the understanding of the social context (e.g. politics, economics, civil society) of effective mitigation and adaptation responses to climate change in Europe and their impact on the European societal development.
- Stimulating research on societal barriers and incentives to respond to climate change and to explore the role of climate knowledge for decision-making.
- Identifying and understanding the interdependent societal roots and impacts of climate change in Europe and global climate change hot spots, including studies in a historical perspective.
- Enabling integrated analyses of the systemic context of European response strategies by identifying and considering socio-ecological and socio-economical limits of mitigation and adaptation strategies, taking into account other syndromes of global change in terms of integrated response strategies.
- Facilitating transdisciplinary discourses on the objectives, the framework conditions and the realization of sustainable societal transformations to a “carbon free”, adaptive European society through active dialogue with stakeholders as knowledge providers and partners for a critical reflection of the research objectives, processes and results.
- Developing suitable social evaluation criteria for the sustainable transformation scenarios, both from a European and a global perspective (e.g. social justice, welfare, satisfaction with quality of life).

The research proposed in this JPI aims to identify and understand the drivers and obstacles of an aspired societal transformation to a “carbon free”, adaptive society. Although the future face of European societies and the avenues to get there will differ according to specific traditions and characteristics of individual societies, a joint European vision for transition and a shared understanding of possible pathways is essential. It needs to be accompanied by considerations on the practical realization of such pathways of societal transformation.

This objective has implications for the foci to be defined as well as the modes of knowledge production. Albeit this JPI module is conceptualized with a clear focus on the European societies, the processes and impacts of climate change appear on a global scale. Climate impacts elsewhere trigger responses in Europe as much as decisions taken in Europe contribute to climate impacts elsewhere. The JPI research aims to take these spatial, as well as temporal, interdependencies into account.

Moreover, climate change is but one out of a number of other inter-related syndromes of global change. Sustainable pathways directed to mitigation and adaptation efforts need to take these interrelations into account, too, and avoid the risk of coping with one challenge at the costs of others. The JPI accentuates the need to cover such systemic interrelations through integrated, interdisciplinary approaches.

So far, approaches to climate change are based predominantly on natural sciences, technological innovation and – more recently – economics and environmental policy. But that does not suffice as prerequisite for societal transformation. Climate change is to be conceptualized in its social dimensions in order to facilitate sustainable response strategies.

In democracies even the most rational solutions to the climate problem can fail, if societal complexity is not well understood. Societal (e.g., socio-political, socio-economical) realities and decision-making are based only to some extent on a rationale perspective. They are at the same time driven by political reasoning and a variety of self-serving interests. Even if a superior goal may be widely accepted, it is not self-evident that individual or collective action will be in agreement with that goal. In fact, climate change is to some degree the outcome of a social dilemma, where individual and collective rationality conflict.

Main research directions

(i) The social dimensions of climate change

Successful response to the challenges of climate change requires scientific insights on both potential and expected impacts of climate change on societies and economies as well as a thorough understanding of conditions and resources for innovative response strategies (e.g., managing commons). But responding to climate change is intimately linked to a cultural change, too, calling for research into the nature and preconditions of transformation processes. Such research needs to take into account the diversity of societal perspectives and allow for stakeholder participation in terms of trans-disciplinary social research.

The mere complexity of societies makes a steered transformation process unlikely, particularly if anticipated without conflicts and rebound effects. It is predictable that rather fundamental conflicts will arise when concrete measures are to be adopted to establish pathways of a sustainable development. Conflicts may be related to incoherent objectives between different social systems or within social systems. Conflicts may also be related to the implementation and the concrete means of meeting the sustainability objectives. Finally, they may be related to power relationships and differing degrees of vulnerability.

In order to govern a process of sustainable societal transformation it is important to be aware of framework conditions constituted by such cornerstones of working democracies. Recent history of societal transformation under climate change reveals that aspects of equity, social justice, human rights, sharing responsibilities and risks – both on a European and a global scale – are among these cornerstones. It is also important to understand what can be learned from history. Particular research efforts are required to explore the emerging research strand on the governance of adaptation and expand existing insights on the governance of mitigating climate change.

These and other criteria related to the social dimensions of climate change will need to be explored as boundary condition or constraint for any mitigation and/or adaptation scenario. Social sciences, thus, need to constitute an integral part of this JPI

- to understand the roots of options and barriers in processes of change and societal crises,
- to understand and prepare for societal conflicts (and synergies), which are to be expected by climate change as well as by mitigation measures and
- to explore the social conditions (enablers, inhibitors) of a sustainable transformation of European societies in the face of climate change.

Social sciences are also strong in addressing procedural aspects of societal transformations. Investigations into the determinants of societal transformation are required both in the individual and social aggregate level, including the role of private and public organizations and rationalities in decision-making and the interaction between both. This will raise questions about how to shape responsibilities and understand the distribution of risks. It will also highlight problems of policy integration and coherence as well as institutional dimensions of transformation processes.

Finally, climate knowledge is not exempt from undergoing complex societal framing processes that give meaning to this knowledge and shape problem perception. These processes need to be studied and understood with relation to climate knowledge in order to help improving communication strategies and means to shape stakeholder dialogues.

(ii) The systemic dimension of climate change

The regional drivers and impacts of climate change are linked to a complex and global socio-ecological system being characterized by feedback processes, delays, uncertainties and indirect effects. Climate impacts elsewhere trigger indirect impacts in Europe as much as European lifestyles trigger climate impact in other world regions. These interdependencies can also refer to societal phenomena, like migration from so called climate hot spot regions, and their consequences. Facilitating a sustainable transformation of European societies in the face of climate change needs to consider the multi-facetted, systemic impacts, societal multipliers and mitigating effects and interdependencies between Europe and other regions.

Research contributions need to take spatial as well as temporal interdependencies into account. Social and economic sciences will play a key role in exploring such indirect effects of climate change, including mutual interactions with other syndromes of global change like the rate of biodiversity loss, human interference with the nitrogen cycle or soil degradation. This perspective will also need to be applied to systemic assessment of technological innovations, including the assessment of renewable resource capacities and their production dynamics as well as resource constraints (e.g. indium or silver) and the analysis of the supply side of non-renewable resources.

Developing and implementing climate response measures needs to acknowledge such constraints (e.g. absorbing and recycling capacity of sinks, resilience) of the global socio-ecological system together with `soft factors` that have proven as important elements of adaptability. The considerable complexity of the systemic dimension of climate change seems to exceed the capacities of our existing management and policy instruments. This might in part explain prevailing political, economical and individual practices to approach systemic problems disjoined.

MODULE (4): IMPROVING TOOLS FOR DECISION-MAKING UNDER CLIMATE CHANGE

Key objectives

- Establishing facilities for continuous and iterative climate model and scenario inter-comparison.
- Enhancing quality and connectivity of various approaches and consistency of modelling communities (Climate Scenarios, Integrated Assessment Models, Impact, Adaptation and Vulnerability Assessments) while maintaining or increasing variety of the scientific landscape.
- Exploring the opportunities and limits of modelling in social sciences and humanities and the formal representation of social systems in coupled or integrated climate models and scenarios.
- Exchanging knowledge and best practice on the development of decision-making tools with active stakeholder participation.
- Establishing learning environments for both modellers and stakeholders allowing for interactive development of new decision-making tools to improve decision processes under conditions of high uncertainty and complexity.

In order to live up to its climate objectives, Europe will be challenged to trade off stabilization levels and their climatic consequences against costs, risks and benefits associated with reaching these levels both in terms of mitigation and adaptation. To this end, implications of different strategies need to be explored and communicated in intelligible categories.

In principle, advanced integrated models and scenarios do provide valuable tools and metrics in that respect. Various sectors and organizations have long-standing traditions in using scenarios to support planning and the assessment of implications of strategic decisions over long time horizons. But the scope of analytic approaches used is far from consistent.

In particular, there is still a lack of consistent socio-economic scenarios allowing robust assessment of adaptation and mitigation strategies in conjunction at levels varying from global to regional. They should enable to iteratively and repeatedly conduct fully integrated assessments of the differential impacts, associated risks, residual damages and marginal adaptation and mitigation costs, e. g. between a 2°C and a 3°C world but also for extreme scenarios like a 6° C or 1.5 °C world.

But even robust assessments of the global and European dimensions of low-stabilization pathways consistent with the 2°-stabilization goal are not really available, let alone scenarios providing an integrated perspective of the risks of choices associated with the various mitigation pathways and other relevant factors that influence the rate of the transition towards more carbon efficiency.

Similar deficits can be stated with regard to adaptation scenarios. First of all, there is an urgent need for consistent downscaling of global socio-economic and climate scenarios to

European or regional and country level, and to integrate vulnerability and adaptation elements into these scenarios. Moreover, comprehensive adaptation scenarios, which are largely unavailable yet at all relevant geographic levels, require more than an adequate understanding of impacts and vulnerabilities. Also risks and uncertainties regarding the stability of societies must be taken into account as well as non-monetary valuation methods or instruments to quantify damages not expressed in changing market values. Those are barely available, which makes it difficult to express for example indirect and higher-order economic effects of climate change impacts in models (like welfare implications from ecosystem change).

Finally, there is deep uncertainty about the possibility of reaching thresholds or tipping points in the climate system, which constitute potentially large risks affecting the assessment of consequences of present-day decisions on longer time-scales.

The different modelling and scenario development communities with an interest in climate change research begin to integrate their concepts, focus their questions, and elaborate converging research strategies. This subject also forms part of the work on new scenarios that support future IPCC reports. The IPCC, thus, may have a catalytic role here, but conversely also needs to be fed with new scenario analyses at European and global levels. But each of the modelling communities (Climate Scenarios, Integrated Assessment Models, Impact, Adaptation and Vulnerability Assessments) needs further incentives to start defining interfaces and moving towards interlinking of models and tools on various levels and scales. At the same time, the results of these scenario and modelling activities will only be relevant for supporting climate policy decisions if they are focusing on policy questions, requiring a special effort to bridge the gap between researchers and policy makers, and additional tools.

Main research directions

(i) Model inter-comparison and integration

Fully integrated assessments need to capitalize on information from different sources in order to assess risks and opportunities for regions and industries, societies and economies and globally linked value chains. Such tools must also take account of not climate-related constraints imposed by the global ecological and societal systems. Scenarios, thus, need to consider dynamics of biophysical, social and economic systems as mutual constraints.

Such work has only started recently. Supporting this development will be an important focus area of this JPI. It holds the potential to coordinate approaches in several member states to develop a holistic picture with regard to adaptation and mitigation requirements consistent with various climate futures.

While European teams are making important contributions to integration of approaches already, cooperation takes place on an ad-hoc basis all too often and with little coordination or comparison. This is why a facility for model inter-comparison will be established as part of this JPI. It will allow bringing together modelling teams from different communities more systematically to enhance quality, consistency and connectivity of various approaches without compromising variety. Convergence would be fostered by the application of various analytic approaches focussing on practical problems related to the specific concerns of planning, policy or investment decisions. It will be crucial, thus, to coequally include users of models or other stakeholders in the enquiries and definition of individual topics under investigation.

Besides a better understanding of particular problems, systematic model inter-comparison provides a scientific apparatus to investigate possible transformation trajectories under different normative assumptions. This will prove instrumental in catalysing robust and sustainable development pathways in terms of uncertainties in the climate as well as in socio-technological systems.

An important basis for this work will be the consistent downscaling of different types of global scenarios to European, national and regional resolutions depending on the spatial scales relevant for decision-making in Europe. This accounts in particular for the field of impacts, vulnerability and adaptation scenarios (building on experience in FP6 and FP7 projects like ADAM and RESPONSES). It will also include the attempt to up-scale some of the most advanced national approaches to a European level. This will also have positive effects on the ambition to achieve more consistency in the formats and storage of data on climate change and on factors determining impacts and vulnerabilities (such as hydrological and land-use data) in the European countries, and encourage progressive agreement on free data exchange within Europe.

(ii) Modelling social systems

Advance in global change research is critically conditional upon the meaningful integration of the natural scientific knowledge base with perspectives from social and economic sciences. Although modelling of social systems has a history of several decades, many of the practitioners in social sciences and the humanities have been hesitant to adopt formal modelling as an instrument to understand the complex dynamics that articulate societies and their environments. In fact, the majority may decline modelling of human processes to support policy processes in principle because people are non-deterministic agents with free choices whose behaviour cannot be captured in the logic of models.

Clearly, models do not provide an appropriate means for modelling the full range of diversity in human relations and behaviour. But we also see promising approaches for example in agent-based modelling and the integration of research findings from cognitive science into models for exploring and explaining human choices in various institutional settings. This certainly also applies to other areas of e. g. land-use modelling as well as economic or demographic models, which have become very common and are important tools in decision-making at the national and global levels (IMF, UNDP, CSD, Work Bank, OECD, etc.). After all, complexity, connectedness, and uncertainty all make it very difficult for the unaided mind to keep track of the intricate webs of causes, effects, feedbacks and anticipations that underlie the dynamics of the global system.

Hence, though being aware of the limitations that modelling of societal dynamics may have, this module will aim to make contributions to the modelling of social systems where it can be expected to add value for integrated modelling of coupled socio-ecological systems, and can support the understanding of societal transformation related to climate change response.

It will be a precondition to analyse carefully, which kinds of models could be used and at which levels formal modelling would be most effective. It will be necessary to reflect on the nature of the insights generated and deliberate the epistemological, conceptual and methodological corner stones of formal modelling. And considerations on modelling social systems must also be mindful of the multiple scales involved. The relevant scale on which the social and the natural systems mainly operate may diverge, and may change over time. Finally, a complete understanding of a coupled socio-ecological system often needs to simultaneously consider a higher-level system in which it is imbedded.

(iii) Enhancing stakeholder dialogue and interaction

Improving decision-making tools does not only rely on models. There is an urgent need to foster the dialog on the science-policy interface and between research and other decision-makers to attain a common understanding of key uncertainties. The development of instruments supporting decision-making need to be driven by the demand of stakeholders, including elected representatives, associations, politicians, and the private and public sectors. It will have to take place in a two-way, cooperative process to enable successful uptake of research results.

It is certainly not straightforward a process to establish such dialogues and to select or develop targeted tools to support them in addition to the scenarios and integrated models discussed above. Success depends on improved understanding of the 'how' and 'why' of strategic decision-making and the institutional dimensions of effective adaptation and mitigation. In fact, we know too little about the way companies, civil organizations, groups of citizens or individuals look at the problem of climate change, how they frame it and in which way this framing might be affected positively in the sense of societal support for response measures. Much of this is part of the research framed in modules two and three.

This part of the JPI will concentrate on the exchange of experiences with stakeholder dialogue in the development of tools for the transformation of knowledge. Moreover, it will address the interactive development of supportive tools which can help improving decision processes under conditions of high uncertainty and complexity. Such tools will have to meet different requirements in terms of robustness, error-friendliness, redundancy, diversity, integration, fuzziness or 'decision spaces', depending on social contexts as well as spatial and temporal scales of decision processes. They may cover applications ranging e. g. from the modification of existing assessment tools to the development of predictive planning tools.

In all cases it will be pivotal to acknowledge the procedural character of assessment and strategic planning. This is one of the reasons why learning will have to be part of the process of developing and using such instruments. A useful set of models and tools will help learning about the probability of future effects of current behaviour and at the same time teach us the limits of our ability to predict. This is assuming that any likelihood may make it easier to take decisions and any kind of prediction, even about uncertainty, may help buying time to learn, if expressed in terms of probability. Hence, one of the major challenges of all decision tools is how uncertainty manifests itself for agents in and users of the model as the system changes.

5. ADDED-VALUE, BENEFITS AND IMPACT

Added value of transnational research collaboration over uncoordinated national research efforts

- We propose a joint programming initiative concentrating on opportunities where we can see a clear added value for European integration in terms of response strategies to climate change beyond specific sectors and levels of decision-making.
- Not advocating harmonization, this JPI will aim to decrease fragmentation and increase consistency in critical areas of climate impact research while maintaining or increasing variety across the European Research Area.
- We are convinced that in these areas national activities alone fall short of meeting the collective demand of knowledge. The climate change challenge and the need of societal development towards sustainable societies require a systemic approach exceeding the research capacities of individual member states.
- While acknowledging the often regional scope of research and decision-making on climate impact and adaptation issues, intensified scientific cooperation across borders would definitely help broadening the knowledge and resource base on which decisions are based. It would also contribute to achieving a competitive advantage of the European Research Area in relation to other world areas in climate research.
- This joint approach shall result in a sound and applicable set of knowledge based tools and instruments for decision-making under climate change. It should substantially improve the base for oncoming negotiations and decisions in the context of climate change on various political levels, and also support planning and investment decisions on regional, local or company level. Thereby it will strengthen the competitiveness of the European economy and enhance communal and national capacities for development towards sustainability.
- By triggering insights on the societal demands and use of climate knowledge this JPI will also enhance the value of the existing knowledge base, facilitating its societal application and thereby improving future decision-making under climate change.
- This JPI will substantially improve the basis for upcoming international negotiations. Decisions on various political levels will improve upon successful implementation of the work.
- Where FP7 climate change-related projects usually have a relatively short lifetime, and collaborations are based on sometimes ad-hoc choices in a competitive environment, JPI supported by EU member states can provide a longer-term vision and stable research collaboration mechanism.
- Clik'EU allows countries which have specific climate knowledge requirements that may not be covered adequately by EU-wide programmes to jointly perform focused research, facilitating the formation of small and efficient consortia of high-quality institutions to establish long-term transnational collaboration.

6. SUGGESTIONS CONCERNING GOVERNANCE & IMPLEMENTATION

(1) PRINCIPLES FOR IMPLEMENTATION

Basically, this initiative should be carried by the member states within their own research and research funding capacities and linked, where appropriate, to other programmes and initiatives on communal, member state or European level. We would suggest, however, keeping in mind three principles for the definition of the thematic scope:

- The initiative shall be kept as focussed as possible to allow effective implementation but wide enough to mobilize a critical mass with a range of researchers and funding bodies.
- The initiative shall address areas of clear added value for European integration.
- The initiative shall address areas of societal importance where national activities alone clearly fall short of meeting the collective demand of knowledge.

We consider it essential to agree on a joint strategic framework first. This should be aimed at capitalizing on the wealth of existing projects, programmes and structures but add to it intensified cooperation in certain areas, which we consider particularly significant to increasing capacity and quality of knowledge-based decision-making with regard to climate change on various levels. *Instruments* eventually employed to implement this strategic framework can be many and diverse. They can include, but are not limited to, joint research funding. *Implementation* might be divided into four phases:

- Phase (1) is to establish the *joint strategic framework* and break each of the focus areas down into research topics as priorities for implementation.
- Phase (2) is to do an *extensive mapping exercise* throughout national and European programmes and initiatives. Parallel to this exercise the work on the *Strategic Research Agenda (SRA)* will be undertaken.
- Phase (3) is to *design work plans and assign responsibilities* for each of the focus areas. Different member states could assume responsibility for the implementation of one or more of these priority topics as sub-programme to the overall initiative. These partnerships would be variable with a composition reflecting the priorities of the individual member states.
- Phase (4) will be devoted to the actual *implementation* of planned activities duly providing for overall synthesis schemes and links to other priority topics. As this JPI aims to establish structures for a long-term, strategic cooperation in climate research within the European Research Area, this phase will also include starting a *revision of the strategic framework and the individual modules* in a later stage and plan follow-up activities.
- *Phases (1)* should be concluded within six months after the council decision. *Phase (2) and (3)* will probably take about a year after final agreement on the strategic framework among the participating member states. *Phase (4)* will span a period adequate to implement the elements of the initiative defined in its initial phase and will include implementing provisions for regular revision and re-iteration of work plans to provide for long-term strategic cooperation.

(2) ESTABLISHING LINKS WITHIN THE EUROPEAN RESEARCH LANDSCAPE

The strength and the challenge of this JPI is that it builds on a variety of existing ongoing and past activities, on international, European, national and regional level. One of the tasks of the JPI will be to watch and collaborate with those programmes and instruments. This will lead to a clear added-value avoiding overlaps and ensuring efficient use of research investments.

After having designed the Strategic Research Agenda, the second step is to choose the appropriate level of implementation. This can be at member states' level but also at European level. Hence one of the first tasks once the JPI will have started will be to draw a very detailed map about past and ongoing programmes.[1] The following part will give a first impression about relevant programmes but is not exhaustive.

European Research Framework Programmes (FP6, FP7, FP8)

The results of past and ongoing FP6 projects will contribute to the knowledge base and contribute to shaping the research agenda of all four JPI modules. Coordinating of activities with past FP6 projects and ongoing FP7 projects will thus be critical to ensure efficient allocation of resources within the European Research Area. The Strategic Research Agenda can serve both as input for FP7 but also for the preparation of the 8th Framework Programme.

ERA-Nets

Another excellent opportunity for collaboration within the Framework Programme will emanate from building strong links with relevant ERA-Nets. This is first and foremost the ERA-Net CIRCLE-2, which focuses on research for climate impact analyses and adaptation response and started in its first phase already to fund joint research projects in trans-national arrangements. CIRCLE-2 will aim to focus even stronger on policy relevance of impact and adaptation research, which may overlap to some extent but at the same time will probably make it easy to establish common grounds for implementation. While CIRCLE2 focuses on broad, Europe-wide impacts and adaptation research programming by research funders and managers, JPI can complement CIRCLE work with its focus on the four issues elaborated in this proposal in a transnational context. Intensive interaction is required to fully capture the opportunities for synergies and complementarity to allow for effective allocation of resources. Cooperation will benefit from the fact that many partners in CIRCLE-2 did actually contribute to the development of this JPI. CIRCLE-2 supports the JPI initiative (see Annex "Letter of support").

Further contiguous ERA-Nets might include EUROPolar (coordinating and networking the European polar RTD programmes), SKEP (Scientific Knowledge for Environmental Protection), CRUE (on flood management) and a number of other ERA-Nets within the domain of environmental research.

[1] The publication "European Research Framework Programme – Research on Climate Change" gives an excellent overview about previously funded and ongoing research projects in the field of climate change. It was prepared for the Third World Climate Conference (Geneva, September 2009) and the 15th Conference of the Parties to the United Framework Convention on Climate Change (COP-15, Copenhagen, December 2009).

ESFRI and other European initiatives on research infrastructures (e.g. I3 projects)

Research infrastructures for climate research from the ESFRI roadmap and other European research infrastructure initiatives will be substantial for the implementation of the research topics from the future strategic research agenda. At the same time, the Strategic Research Agenda can serve as input for future updates of the ESFRI roadmap. This may enhance the probability for national co-funding by organizations contributing to this JPI.

International data and observation infrastructures

Clik'EU will establish effective links to relevant international data and observation infrastructures as maintained for example by the Global Earth Observation System of Systems (GEOSS), the Global Terrestrial Observing System (GTOS), the Global Climate Observing System (GCOS), the Global Oceanic Observing System (GOOS), as well as the Global Monitoring for Environment and Security (GMES) as European Initiative for the establishment of capacity for Environment and Security Monitoring.

Also EUMETNET provides an important framework as it organises co-operative programmes between the Meteorological Services in various fields. The EUMETNET European Climate Support Network is working towards the provision of European Climate Services, and Clik'EU could support that initiative through long-term stable research collaboration between key member states. Finally, the European Clearinghouse on Climate Change Impacts and Adaptation and the existing Working Group on Knowledge Base on Climate Adaptation (support of the future Clearinghouse contractor) will constitute an important reference point for the dissemination of results to a variety of stakeholders, including needs for consistent and up-to-date information and advice for European policy making (e.g. Commission, EEA, EFI, JRC, and European parts of e.g. FAO, WHO, WMO, etc.) and links with the European Environment Agency (EEA) and the ETC/ACC.

EIT – Climate KIC

The opportunity for co-operation also applies to the Knowledge and Innovation Community Climate-KIC part of the European Institute of Technology and Innovation (EIT). The business-innovation perspective of Climate KIC provides contextual knowledge and stakeholder contacts, emanating from companies' perspectives. In turn, research partnerships between Clik'EU and Climate KIC contribute to realize the EIT goal of connecting European business, education and research. Many organizations involved in Clik'EU so far will also substantially contribute to Climate-KIC in future. Therefore, Clik'EU will be closely linked to this KIC in future.

Other JPIs

An important opportunity for joining forces arises from the fact that in addition to the JPI Clik'EU there will probably be other Joint Programming Initiatives which show common interests to some degree. This applies in particular to the research envisaged within the JPI Agriculture, Food Security and Climate Change, which will most probably provide specific insights and case studies of decision processes with respect to climate change and the agricultural sector. The same holds true for URBAN EUROPE that will investigate one of the most powerful, irreversible, and visible forces on Earth, associated with social and physical transformations at a time.

International co-operations

Last but not least, the frameworks provided by the international global change research programmes of the Earth System Science Partnership (WCRP, IGBP, IHDP and Diversitas) are eminently important for the further development and implementation of the JPI. In this respect, the International Group of Funding Agencies for Global Change Research (IGFA), which promotes interaction with the International Global Change Research Programmes, could help the JPI to embed the European strategy in international programming.

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(3) GOVERNANCE GUIDELINES

- Guidance on overall strategic orientation and structure of the initiative will be provided by a **Governing Board**. All partner countries will be represented by the relevant funding organisations for JPI-related climate research. An **Executive Committee** of that board, elected or appointed by the governing board, will be responsible for overseeing the operational management of the JPI including its coordination units.
- The overall coordination and day-to-day management of the initiative shall be supported by a **Central Programme Office**, set up as early in the process as possible. The office will report to the Governing Board via the Executive Committee. Specific parts of the JPI could be managed by separate programme nodes.
- A **Trans-disciplinary Advisory Board (TAB)**, consisting of scientists as well as representatives of central stakeholder organizations, will be established to be consulted by the Governing Board regarding scientific orientation and revision of the initiative.
- The actual **implementation of the priority topics** could be organized with a governance structure set up in accordance with principles established by the Governing Board but not be bound by instructions of that board. The governance of the implementation of a priority topic would thus abide by overall guidelines but in its details essentially serve the individual needs of the variable partnerships supporting the implementation of the different priority topics. Each sub-process of the JPI will be led by a **sub-committee of the Governing Board** consisting of up to three lead partners for each of the major implementation strands.

ANNEX: LETTER OF SUPPORT ERA-NET CIRCLE-2

Faculdade Ciências Universidade Lisboa
fundação

Letter of support to the Joint Programming Initiative Click'EU

To whom it may concern,

As coordinator of the CIRCLE-2 ERA-Net (Climate Impact Research and Response Coordination for a Larger Europe) I confirm that CIRCLE-2 fully supports the development of the Joint Programming Initiative "Connecting Climate Knowledge for Europe" (Click'EU).

It is CIRCLE-2 prime objective to support European policy and research on Climate Impacts and Adaptation. To this end, CIRCLE-2 builds upon an extensive network of key European research funding and managing organisations, cooperating on Climate policy and research since 2004. Its ultimate goal is to establish a fully functional European Research Area on Climate research by implementing a transnational joint programme in this field.

CIRCLE-2 can offer existing and tested coordination mechanisms (e.g. strategic research agenda, joint calls for projects, proposal peer-reviewing mechanisms, joint foresight, expertise mapping, shared information resources and joint implementation of activities) and test new ones (e. g. common monitoring rules, common financial rules).

Because of the common field of both initiatives and since duplication of activities is not a desirable outcome, a large number of CIRCLE-2 partners have already contributed to the development of the JPI "Click'EU". Furthermore, within its work programme, CIRCLE-2 has a specific task (2.3.) designed to support the potential implementation of joint programming in EU countries and in CIRCLE-2 participant countries.

It is CIRCLE-2 view that the JPI "Click'EU has the possibility to provide important and complementary frameworks for joint investments of European partnerships into enhancing the practical value of climate research for policy, planning and investment decisions.

The JPI "Click'EU is structured around four modules that can provide excellent opportunities to for collaboration and that fit well with CIRCLE-2 strategic research agenda. We look forward to further developing these two initiatives as close-fitting centrepieces of a European climate research area.

In essence, cooperation between CIRCLE-2 and JPI "Click'EU" is considered has an excellent opportunity to develop a common vision and a complementary framework capable of providing for an efficient allocation of resources within the European Climate policy and research area.

Lisbon, 18 April 2010

Sincerely,

Tiago Capela Lourenço

(*CIRCLE-2 Coordinator*)