Climate Resilient-Regions through Systemic Solutions & Innovations

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ARSINOE: Building a low-carbon, climate resilient future: Research and innovation in support of the European Green Deal (HORIZON 2020)

- **Shaping the pathways to resilience by bringing together Systems Innovation Approach (SIA) and Climate Innovation Window (CIW), to build an ecosystem for climate change adaptation solutions**

- **The approach is show-cased in nine widely varied demonstrators, as a proof-of-concept with regards to its applicability, replicability, potential and efficacy.**

- **The consortium consists of 41 partners with the University of Thessaly being the project coordinator**

- **Total Budget: 15,000,000 Euros**

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Adaptation to Climate Change

Introducing Climate Change & Adaptation

CLIMATE CHANGE

Is complex and interconnected with other global challenges such as food security, water scarcity, biodiversity depletion and environmental degradation

ADAPTATION

Refers to all approaches taken to adjust, prepare for, and accommodate new conditions that are created by changing climates

ADAPTATIONS MAY BE...

Cultural and Societal, or financial solutions. For natural-resource managers, adaptation strategies also include actions taken to assist natural resources (species, habitats, forest plantations, watersheds, etc.) in accommodating new conditions imposed by climate, but also facing socio-economic impacts brought about by a worsening climate migration crisis

THREE TIER SOLUTION...

SYSTEMS INNOVATION APPROACH

SIA addresses the growing complexity, interdependencies and interconnectedness of modern societies and economies, focusing on the functions of the cross-sectoral system "as a whole" and on the variety of actors, instead of focusing on specific functions or individual/sectorial benefits. SIA analyses the challenges,

CLIMATE INNOVATION WINDOW

CIW is the EU reference innovations marketplace for climate adaptation technologies. Created through previous EU-funded project BRIGAID to facilitate the market exploitation of validated solutions by interested parties (individuals, social groups, regional, national and supra-national stakeholders, CIW offers tools and technologies

ECOSYSTEM FOR CLIMATE CHANGE ADAPTATION SOLUTIONS

Pathways to solutions are co-created and co-designed by stakeholders, who can then select either existing CIW technologies, or technologies by new providers (or a combination) to form an innovation package for resilience to climate change

02

Objectives & Concept

Objectives...

- ✓ **Objective 1:** To facilitate a fundamental transformation of economic, social and financial systems
- ✓ **Objective 2:** To support recovery from the COVID-19 crisis and climate resilience through the implementation of the EU Next Generation Fund Recovery and Resilience Plans (RRP's)
- ✓ **Objective 3:** To support communities and scientists in efficiently evaluating environmental and economic effects of climate change and understanding the impact of possible interventions via Living Labs and through advanced social VR experiences and VR workshops
- ✓ **Objective 4:** Offer advanced Environmental Intelligence services and tools, through an interactive platform allowing multiple stakeholders to collaborate in environmental management and co-derive adaptation solutions to strengthen multi-sectoral climate resilience, supported by the Collective Environmental Intelligence, Data Hub, and Knowledge Graph
- ✓ **Objective 5:** To quantify, model and manage climate risk in a systematic way through resilience analysis (that considers natural and built systems and their interactions, thus exploring cascading effects) and is co-created and co-designed with the stakeholders
- ✓ **Objective 6:** To facilitate knowledge transfer and exploitation for start-ups and SMEs, trigger industry-academy-SME collaborations and eventually enable the establishment of a Climate Adaptation innovation ecosystem by implementing an Innovation Bazaar Contracting Scheme

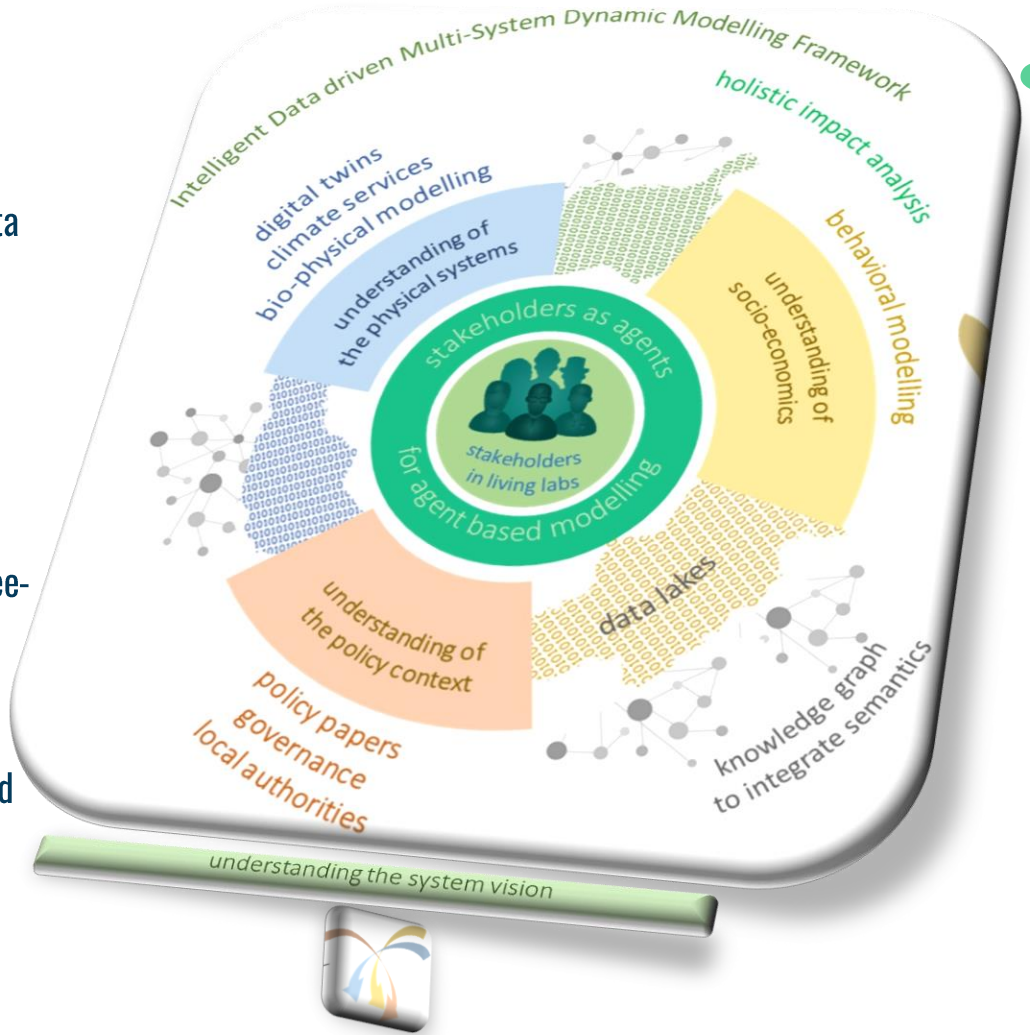
Concept...

Collective Environmental Intelligence Data Hub & Knowledge Graph

Agent-based Modelling

The Systems Innovation Approach (SIA): Co-Creation, CO-Design Stakeholder behaviour, policy assessment, and the tree-tiered engagement process

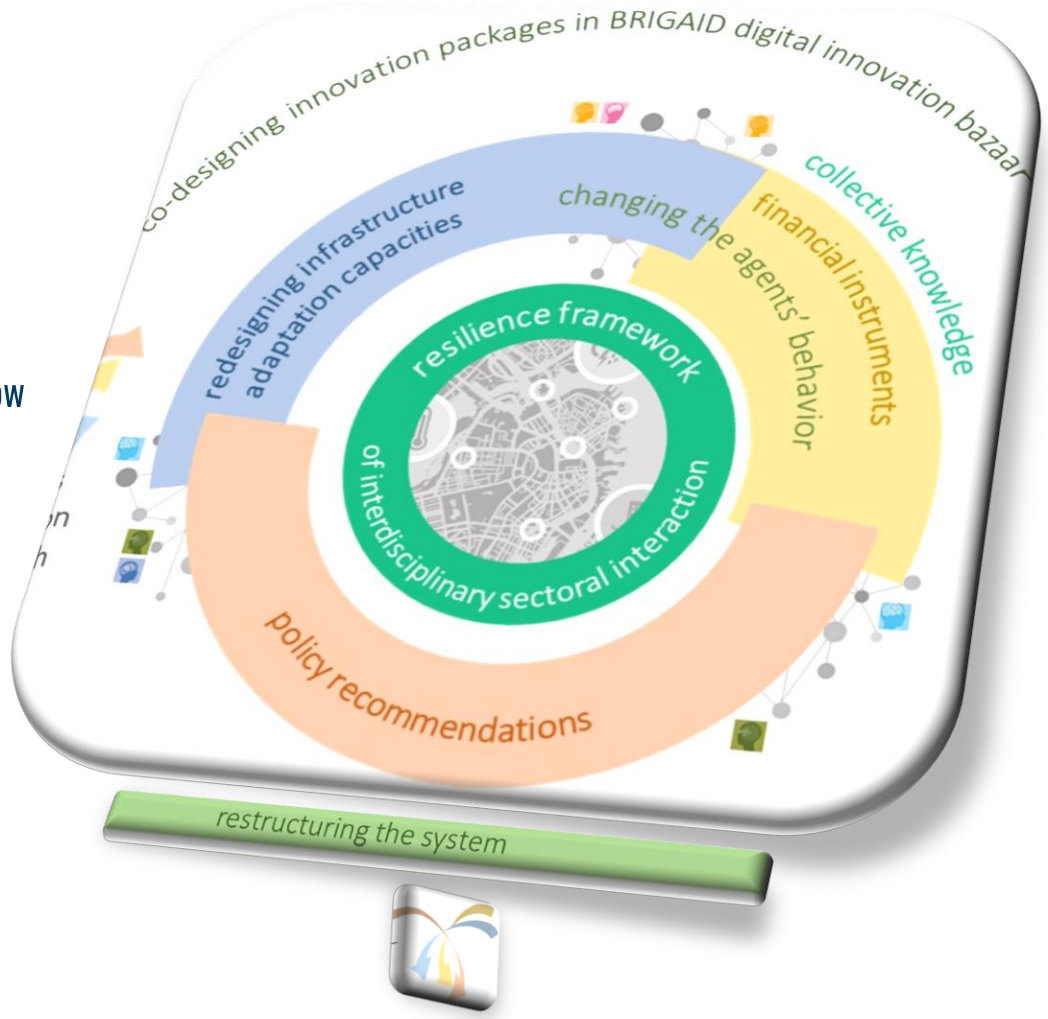
Multi-System Dynamic Modelling Framework for Resilience Assessment and Implementation using Distributed Simulation



Concept...

BRIGAID Connect and the Climate Innovation Window

Innovation Bazaar Service Contracts for innovators



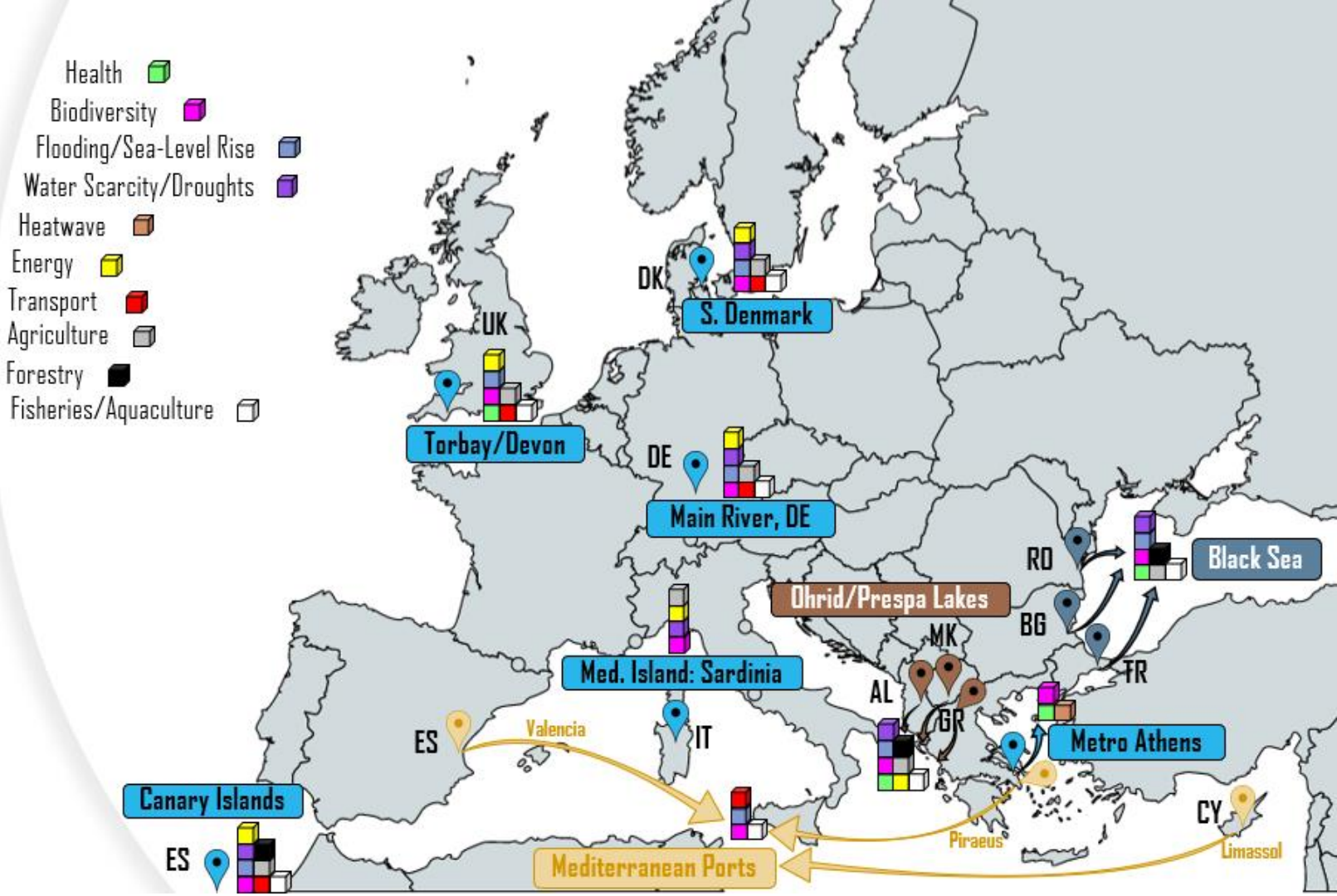
Concept...

User-Validated Climate Resilient Innovation Packages

03

Case Studies

An overview...


Health
Biodiversity
Flooding/Sea-Level Rise
Water Scarcity/Droughts
Heatwave
Energy
Transport
Agriculture
Forestry
Fisheries/Aquaculture
DK
S. Denmark
UK
Torbay/Devon
DE
Main River, DE
RO
Black Sea
Ohrid/Prespa Lakes
BG
MK
TR
AL
GR
Metro Athens
Med. Island: Sardinia
ES
Valencia
IT
Canary Islands
ES
Mediterranean Ports
Piraeus
CY
Limassol

CS1: Greening the Athens metropolitan area

Education, Outreach & Innovation through Green Cross International

Climate change base layer and Urban Heat Island

Green Infrastructure

Biodiversity

Vulnerability Assessment

Youth Assemblies and Training for Trainers

CS2: Mediterranean Ports

CLIMATE RESILIENCE

Addressing infrastructure and maritime transportation by improving their resilience

PRIMARY PRODUCTION, ENVIRONMENT & BIODIVERSITY

Improving transportation related to fisheries and aquaculture as well as environment, including biodiversity adjacent to seaports considered

Limassol

Piraeus

Valencia

HEALTH & WELL-BEING

Avoiding cascading effects of climate change on human communities, including risk of mortality and relocation

CS3: Main River, Germany

WATER

Focusing on stream and groundwater quality and quantity, examining specifically the impact of anthropogenic activities such as agriculture, energy production, and waste management , on the hydrogeochemical pathways between the terrestrial and aquatic environments , on land resources competition and ecosystem services, etc.

ENVIRONMENT-BIODIVERSITY

Providing the required innovation to build multi-sectoral resilience and adaptive capacity to reach the ambitious emission reduction targets while establishing and maintaining water-energy-food security and ecosystem integrity

CLIMATE

In-situ & remote sensing driven and aiming to improve the data availability for resilient infrastructure while supporting environment-aware decision making; hydroclimatic modelling to reveal the

CS4: Ohrid/Prespa Lakes

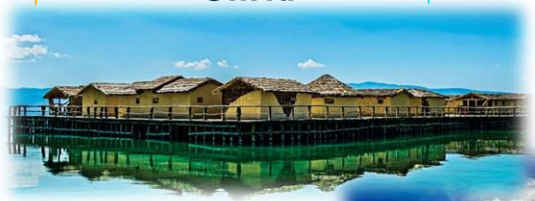
CLIMATE RESILIENCE

Providing an intelligent comprehensive innovation set of long-term planning solutions, allocation and use of sufficient quantity and of adequate quality water for all users, respecting their interests in order to improve human health, food production, conservation of natural environmental systems, clean energy production and sustainable growth of all sectors

WATER

Bridging the gap between social and economic aspect facing the climate changes impacts on a transboundary surface water ecosystem of the two lakes

Ohrid



Prespa

ENERGY

Clean energy production from 5 hydropower plants will be included in the analysis of optimal water allocation and climate adapted usage and management

PRIMARY PRODUCTION AND TERRESTRIAL BIODIVERSITY

Will be analyzed to propose a new water governance management framework, adapted to climate change challenges

CS5: Canary Islands

WATER

The agricultural sector is the largest water user in the Canary Islands, where wine, potatoes and tomatoes are the main exports. Therefore, greater sustainability within the water sector (through the water footprint and the carbon footprint) will positively affect the agricultural sector and, therefore, the water and energy situation of the archipelago

PRIMARY PRODUCTION-ENVIRONMENT-ENERGY

Focusing on the ecological transition and vulnerability of aquifers in volcanic islands putting further efforts to the primary production including agriculture, forestry, fisheries and aquaculture, water management and clean energy

CS6: Black Sea

WATER

Following an integrated watershed management approach –from source to open sea- and providing climate resilient good practices, that will enhance the adaptive capacity of ecosystems and the local communities involved

ECOSYSTEMS

Proposing to study the whole ecosystem in three sub-studies: the headwater, the riverine and the coastal

CLIMATE

Black Sea is a unique marine ecosystem that may face serious climate induced problems exacerbated by anthropogenic influences. The watersheds draining into the sea provide nutrients and pollutants including plastic litter

CS7: Southern Denmark

FISHERIES & AQUACULTURE

CLIMATE CHANGE

To build sustainable resilience to both direct and cascading impacts of flooding, systemic solutions involving different scales and socio-economic sectors that exploit intelligent water management and other innovative technologies, nature-based solutions, governance models, and financing instruments will be pursued and co-designed.

ECOSYSTEMS-BIODIVERSITY

Assessing the interplay between human activities, coastal protection and ecosystems preservation

CULTURAL HERITAGE/RESIDENTIAL & COMMERCIAL BUILDINGS/TRANSPORT/WATER & SEWAGE INFRASTRUCTURE

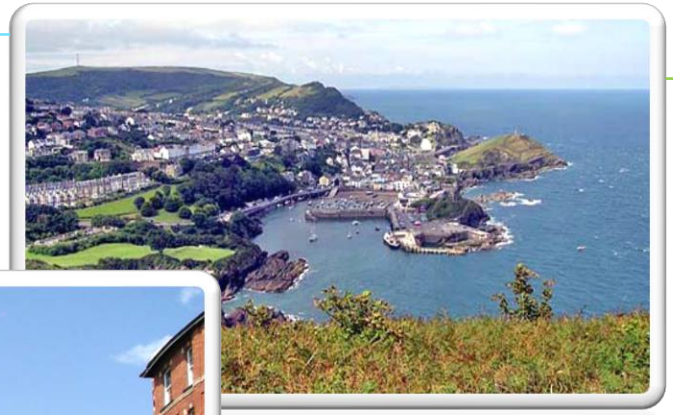
PRIMARY PRODUCTION

Identifying pathways for exploiting the potential of the urban-rural nexus involving agriculture and horticulture in Southern

CS8: Torbay & Devon County

WATER

Assessing by looking at the effects of flooding on the water supply network



ENVIRONMENT-BIODIVERSITY

Assessing by investigating the effects of flooding on the local environment

HEALTH

Identifying residential properties at risk and assessing the effects of this flooding on health

INFRASTRUCTURE

Infrastructure including clean energy and transport will be assessed within the case study by assessing the effects of flooding on critical infrastructure including roads, railways, electric gas, water, telecommunications, etc

CS9: Sardinia

WEF NEXUS IN AGRICULTURE

Enhancing staple food production and yield stability by: (i) optimizing the use of irrigation water in some critical stages of the plant growth; (ii) optimizing the use of energy required to move the water needed for irrigation; (iii) creating and sizing above-ground water reservoirs to develop an irrigation system totally powered by autonomous renewable resources and with

SAVING LAND

Enhancing crop production in the most fertile agricultural areas will save land with beneficial effects for alternative uses of the soil resource

SOIL BIODIVERSITY

The use of new animal by-products N-fertilizers originating from a physical method will set the framework of sustainable and circular economy, enhancing the soil biodiversity; thus, improving the environmental impact of

04

Ambition

AMBITION

SOCIO-ENVIRONMENTAL SYSTEMS PARTICIPATORY MODELLING

Aiming at providing a novel paradigm for modelling socio-environmental systems in a participatory way, considering the close collaboration among scientists from distant disciplines. This approach will enable moving from the traditional data world perspective towards a knowledge world perspective. It will further support the bridging of the gap that arises due to different epistemological backgrounds of the involved scientists

NATURAL AND SOCIETAL SYSTEMS INTERPLAY AND KNOWLEDGE GRAPH DEVELOPMENT

Aiming at developing a KG targeted to tackle environmental problems in a holistic way, considering representation and fusion of information made available for scientists of distant disciplines. Through the development and continuous refreshing of the KG, the main goal is to bridge epistemologies and ontological differences across disciplines. Interlinking of concepts defined in a discipline-specific way will enable fusion of data that is represented in a different way in terms of

MULTI-SYSTEM DYNAMIC MODELLING FRAMEWORK FOR RESILIENCE MANAGEMENT

Aiming at further researching in hybrid simulation and hybrid modelling by developing a multi-system dynamic modelling framework for resilience management, the components of which not only include modelling of man-based systems but also extend to natural systems. Furthermore, it will explore synergies that could be realised through "interoperability of implementation" and further towards composability of

AMBITION

SYSTEMS INNOVATION APPROACH/BEHAVIORAL MODELS/SUSTAINABLE FINANCE & ECONOMIC INSTRUMENTS

- **SI will be considered as an interactive process between many actors, including companies, universities and research institutes. Individual organisations rarely possess all the knowledge necessary for the whole process of innovation;**
- **SI will help to involve continuous feedback loops between the different stages of the innovation and knowledge produced. This is important because the innovation does not follow a linear path - it begins with research, moves through the processes of development, design and engineering, and production, and ends with the successful introduction of new products and processes;**
- **SI approach has considerable appeal for policymakers. The concept of a system of innovation brings together in a single framework the elements of good practice**

GOVERNANCE ASSESSMENT TOOL INTEGRATED TO SYSTEMS INNOVATION APPROACH

The GAT will be integrated to the systems innovation approach to provide important information of the governance context and its vulnerabilities to face environmental challenges. In return, the SIA will support the identification of recommendations to address to stakeholders regarding levers and locks of the existing governance to be efficient in facing new environmental issues. The integration of the two methods should permit to increase the understanding of the role of the governance in the process of adaptive capacity co-creation.

Thanks!

Do you have any questions?

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