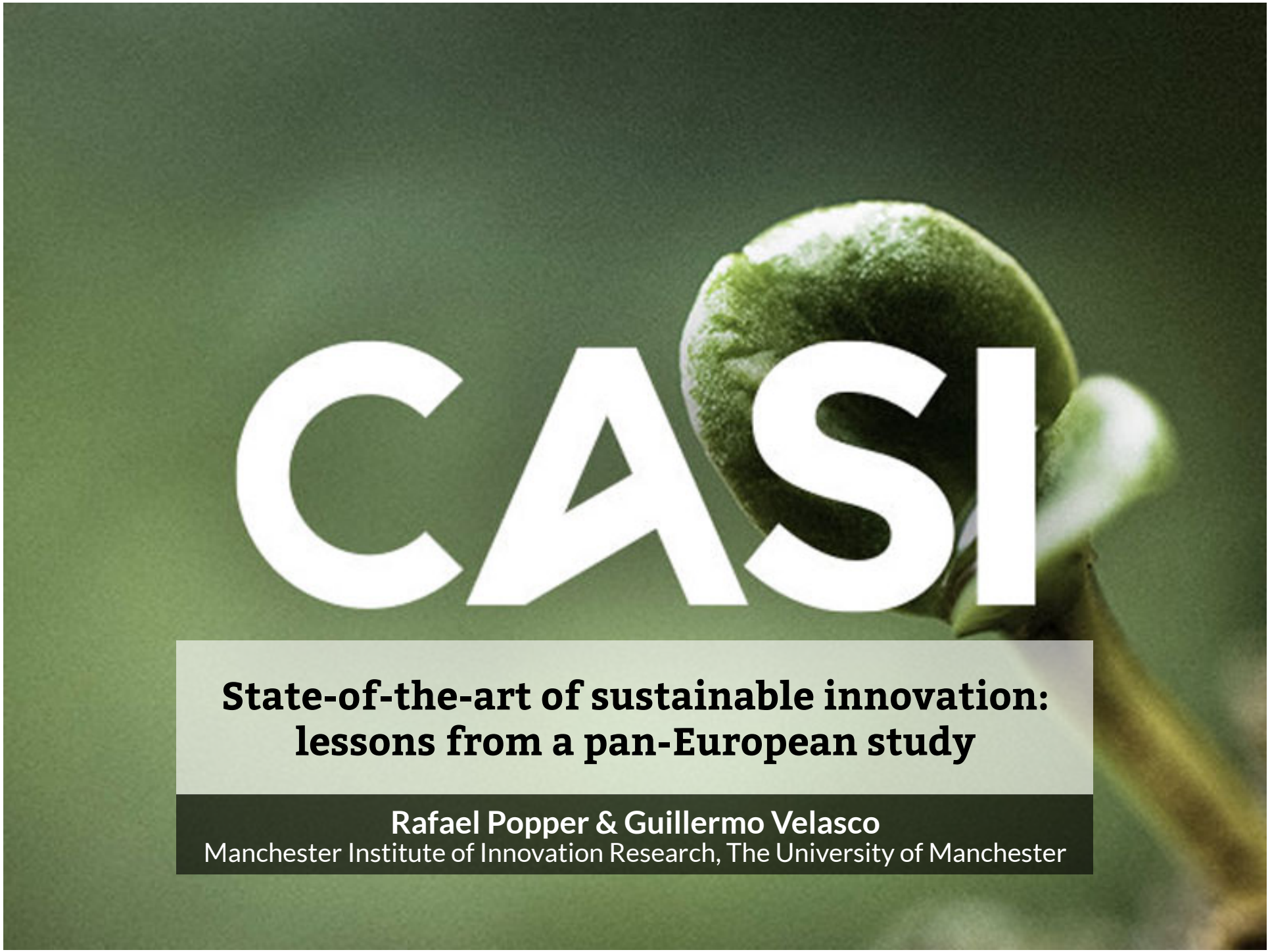

State-of-the-art of sustainable innovation: lessons from a pan-European study

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Manchester Institute of Innovation Research, The University of Manchester

Contents

- The session positions sustainable innovation in terms of key European SI priorities.
- It also introduces key factors affecting SI assessment as well as a comprehensive review of the most important issues to be considered in SI management.
- The session consists of 4 blocks:
  - Key SI priority areas
  - Key features of SI by type and scale of innovation
  - Key success factors, drivers, barriers & SWOTs from SI assessment
  - Key dimensions, aspects and critical issues for SI management

CASI


Key SI priority areas
CASI

CASI focuses on Societal Challenge 5

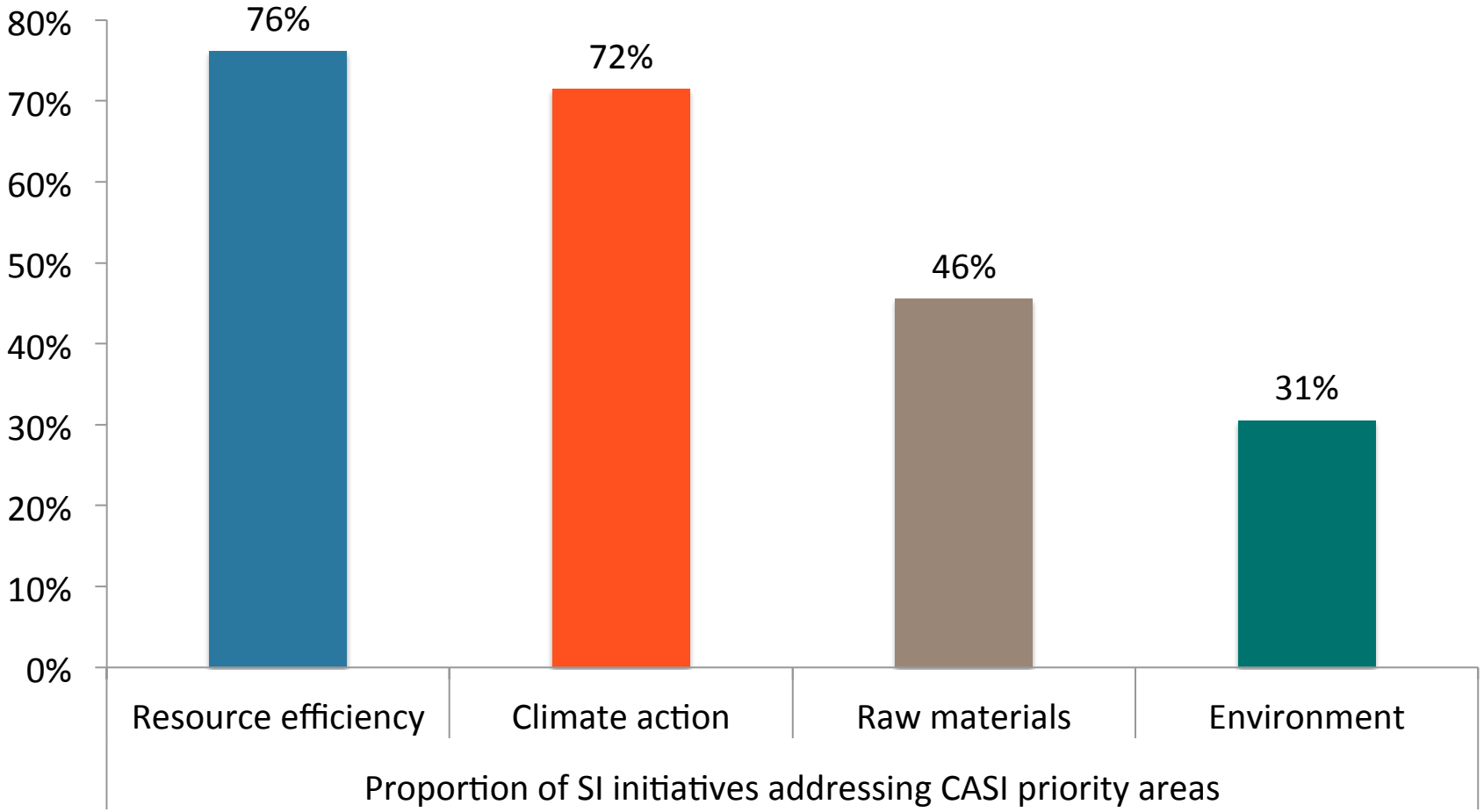
1. Health, demographic change and well-being
2. Food security, sustainable agriculture and forestry, marine, maritime and inland water research, and the bio economy
3. Secure, clean and efficient energy
4. Smart, green and integrated transport
5. **Climate action, environment, resource efficiency and raw materials**
6. Europe in a changing world – Inclusive, innovative and reflective societies
7. Secure societies – Protecting freedom and security of Europe and its citizens

CASI

CASI Thematic Areas

Resource Efficiency	Climate Action	Raw Materials	Environment
1. Solutions for water imbalances	1. Climate change projections and scenarios	1. Long-term raw materials availability	1. Biodiversity examination and understanding
2. ICT systems improving resource efficiency	2. Climate change adaptation solutions	2. Solutions to explore, extract, process & recycle	2. ICT systems mapping natural resources and trends
3. Resource efficient sustainable lifestyles	3. Climate change mitigation solutions	3. Alternative raw materials	3. Solutions for cultural heritage assets
4. Eco-innovation and green economy transition	4. ICT systems to assess and predict climate actions	4. Awareness on raw materials shortage	4. Strategic intelligence and citizens' participation
	5. Climate action by sustainable lifestyle	5. ICT systems to map raw materials trends	
	6. Effective climate action eco-innovation policies	6. Eco-solutions to reduce raw materials use	
		7. Raw materials conscious sustainable lifestyle	
		8. Effective raw materials policies	

% of SI initiatives by CASI priority areas



CASI


Resource Efficiency
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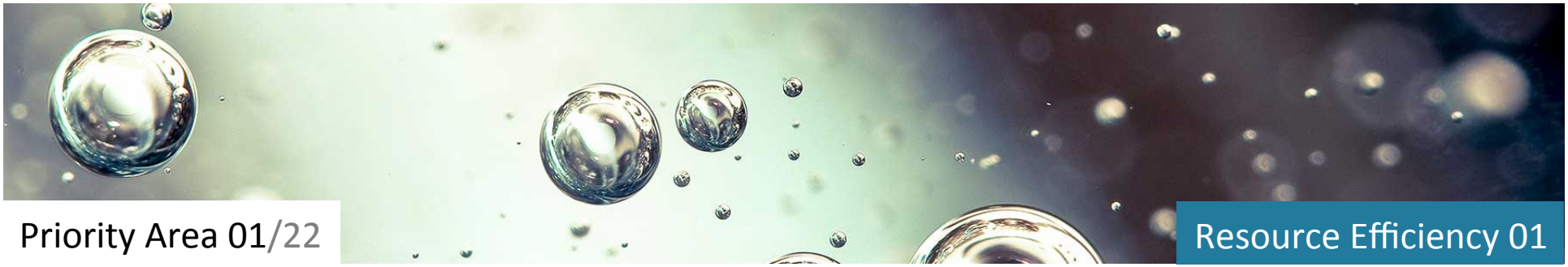


Priority Area 01/22

Resource Efficiency 01

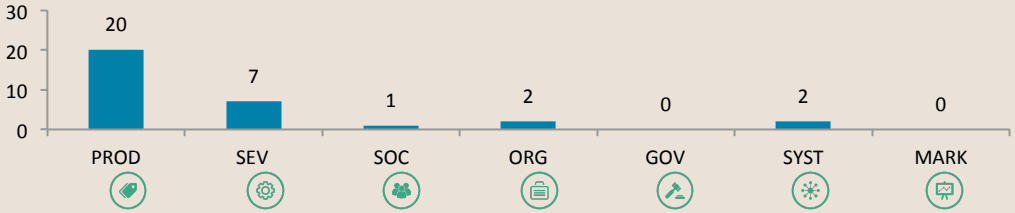
Solutions for water imbalances

Developing integrated approaches to address water-related challenges and the transition to sustainable management and use of water resources and services

Integrated strategies, tools, technologies and innovative solutions to meet current and future **needs**.

To develop appropriate water management strategies, improve water **quality**, cope with **imbalances** between water demand and availability or supply at different levels and scale, close the water cycle, promote sustainable end-user behaviour and address water-related risks whilst sustaining the integrity, structure and functioning of the aquatic ecosystems.

Nominated cases: 32, Selected & mapped cases: 10



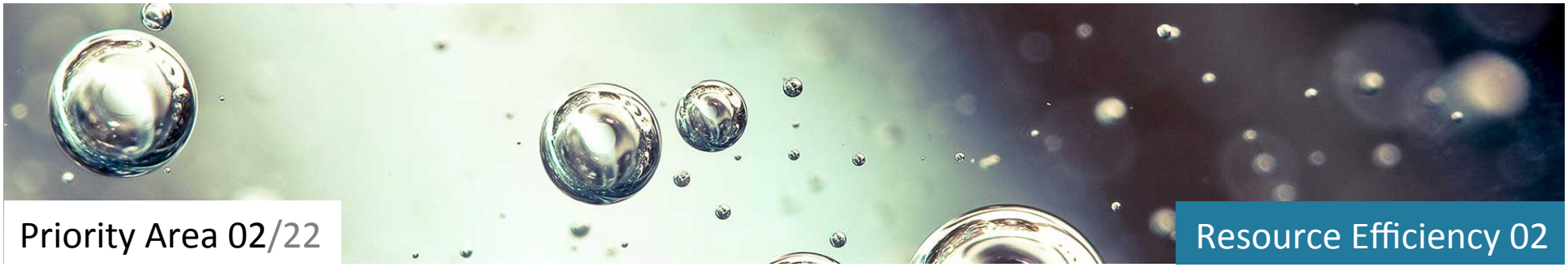
FR **WMS1000**

The WMS1000 Wind Turbine produces water without any external power source. Wind is the only energy used. It is perfectly adapted to supplying remote areas.

EU **INNERS - Innovative Energy Recovery Strategies in the Urban Water Cycle**

Water transport solutions are combined with recycling and energy recovery from waste water .

CASI

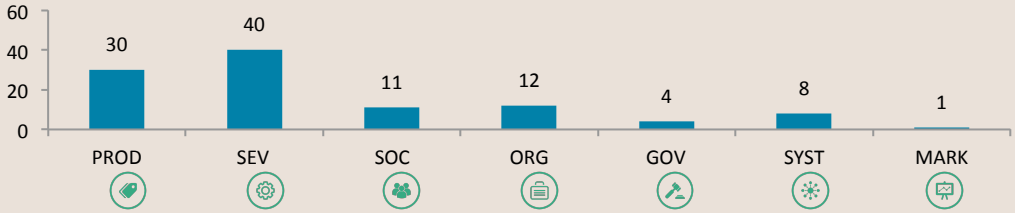


ICT systems to improve resource efficiency

Fostering resource efficiency through digital systems

Innovations in information and communication technologies to gain efficiency in **productivity**, notably through automated processes, real time **monitoring** and decision support systems, in order to foster resource efficiency.

Nominated cases: 106, Selected & mapped cases: 36



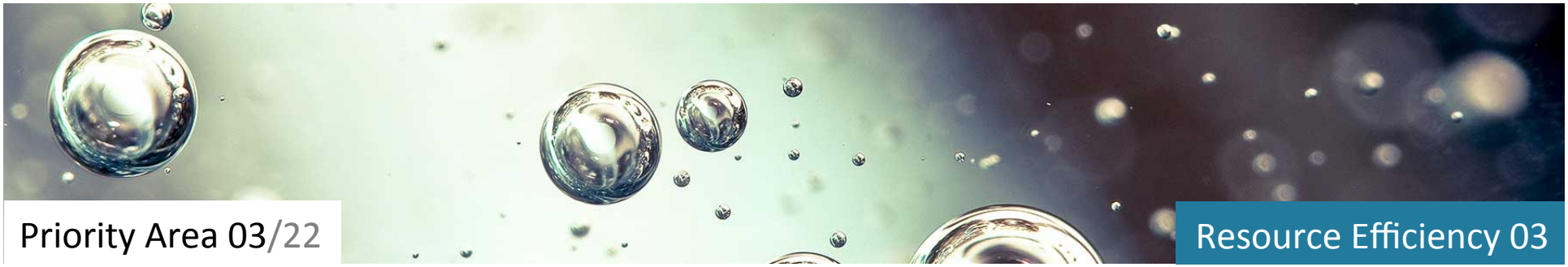
EU **ELSYS - Electronic system for international transfer of waste**

Waste operators can apply/ receive permission from authorities for international waste transfer. GIS allows government to check route and change if there are objective reasons.

GR **Collection and Management of Energy from Renewable sources**

The Intelligent Power Manager (IPM) can be programmed to consume energy from renewable sources, from the grid, or from a generator.

CASI



Priority Area 03/22

Resource Efficiency 03

Resource efficient sustainable lifestyles

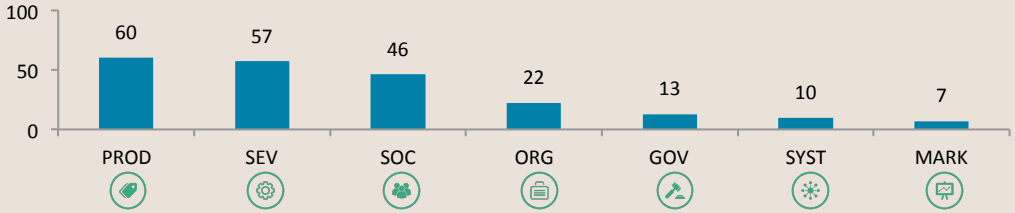
Supporting innovative policies & societal changes based on resource efficiency actions

Research and innovation to address the main barriers to societal and market change, aiming to empower consumers, business leaders and policy makers to adopt **innovative** and **sustainable behaviour**, with contributions from **social sciences** and **humanities**.

Tools, methods and models to assess and enable the main economic, societal, cultural and institutional changes needed to achieve a paradigm shift towards a **green economy**.

To promote sustainable lifestyles and consumption patterns, encompassing socio economic research, behavioural science, user **engagement and public acceptance of innovation**, as well as activities to improve **communication** and **public awareness**.

Nominated cases: 215, Selected & mapped cases: 97



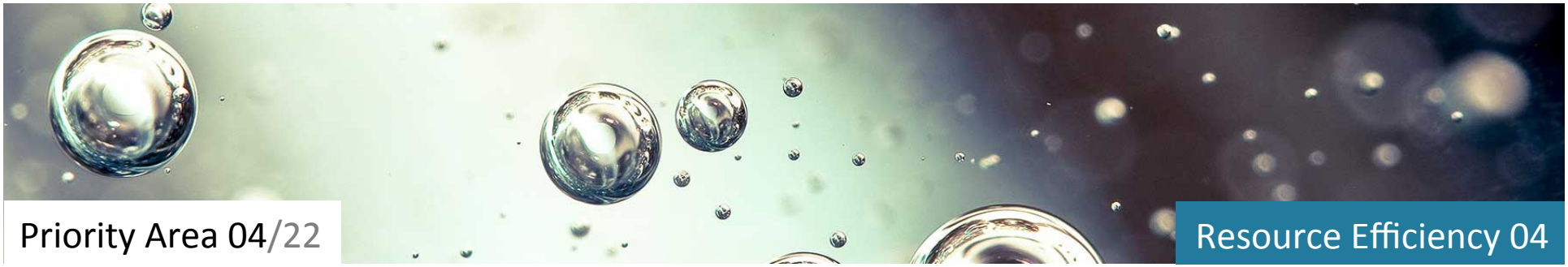
SP **Actyva**

An integral cooperative aiming to realise a model of local sustainable agriculture following agro-ecological &food sovereignty principles, based on mutual aid . A Big Brother Bio-Farming platform encourages small organic producers to live-stream activities happening in their farms.

BE **De Wakkere Akker**

Community based on social, ecologic, healthy, education, economic principles. Citizens can become a member by €250/ year. That amount stands for a 'harvest share'.

CASI



Priority Area 04/22

Resource Efficiency 04

Eco-innovation and green economy transition

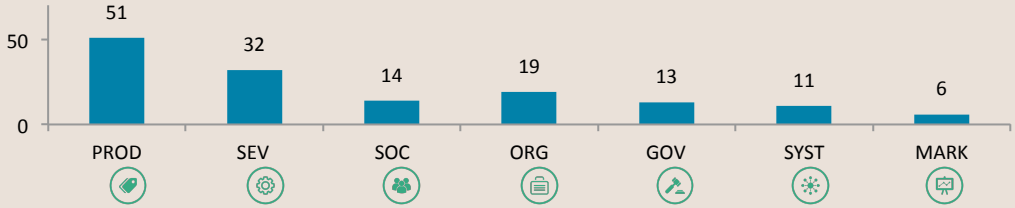
Measuring and assessing progress towards a green economy based on resource efficiency actions

Robust **indicators**, **methods** and **systems** to support and assess the transition towards a green economy and the effectiveness of relevant resource efficiency policy options.

Socio-economic research for a better **understanding of the root causes of producer and consumer behaviour.**

Technology assessment methodologies and integrated modelling to support resource efficiency and eco-innovation policies.

Nominated cases: 146, Selected & mapped cases: 70



SE **LundaMaTs**

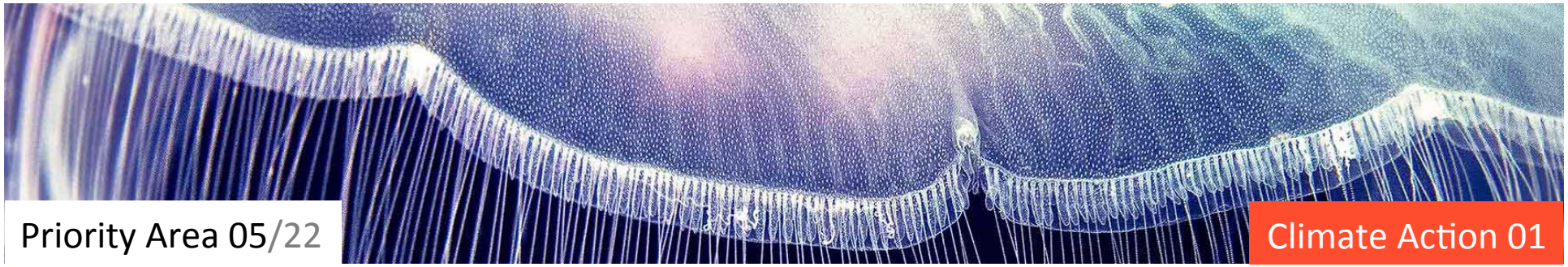
Strategy for sustainable transportation system in Lund municipality until 2030. It structures its work in 6 focus areas including village development, living city centre, commercial transport, local commuting, growing & innovative Lund

CZ **ČEZ Group Smart Region Project**

Up until year 2015, 4.5 thousands of households and enterprises were equipped with smart meters of energy, infrastructure for electro-mobility and elements of the automation & monitoring distribution network.

CASI


Climate Action
CASI



Priority Area 05/22

Climate Action 01

Climate change projections and scenarios

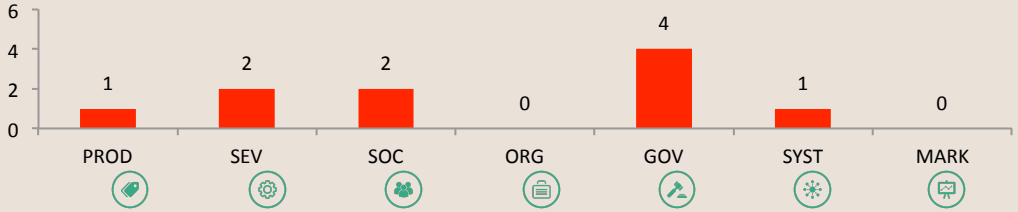
Improving the understanding of climate change and the provision of reliable climate projections

Getting a more consistent knowledge on the **factors and drivers associated to climate change** is essential to devise more effective mitigation and adaptation solutions.

A better understanding of these factors and drivers can be achieved through the **development of more accurate measurement systems, scenarios and models.**

Improved **climate projections (time-based and/or geographical)** can actually serve as base for scientific explanations on the functioning of Earth ecosystems.

Nominated cases: 10, Selected & mapped cases: 4



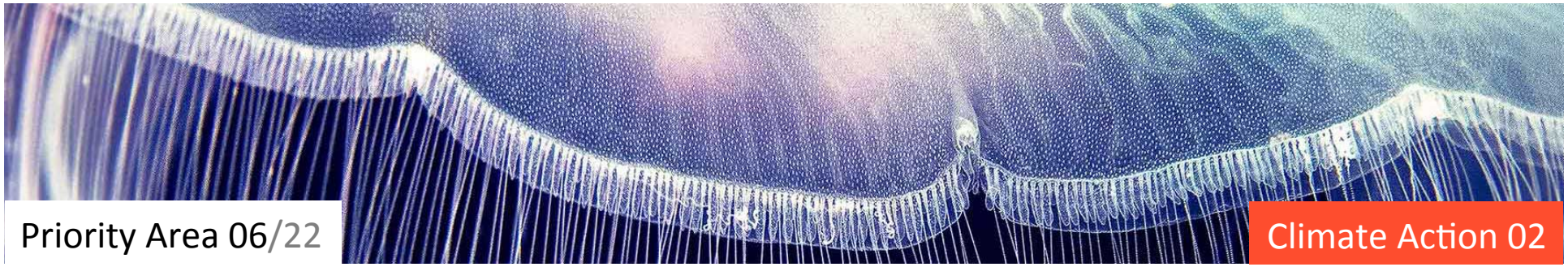
BE **Smart Climate Map**

To map initiatives and companies that contribute to become climate neutral in 2030. It enhances transparency about how firms contribute to reduce GHG emissions in Leuven.

DK **Centre for IT-Intelligent Energy Systems in Cities (CITIES)**

Integrated research centre covering all aspects of the energy system based on methods to forecast, control & optimize their interactions through advanced data & decision analysis, graphic info systems, and modelling,

CASI



Priority Area 06/22

Climate Action 02

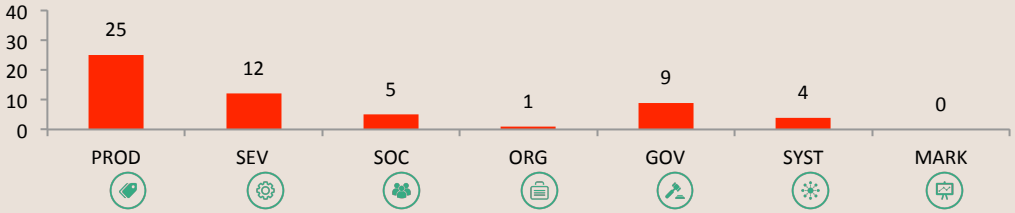
Climate change adaptation solutions

Assessing impacts and vulnerabilities and developing innovative cost-effective adaptation, risk prevention and management measures

Innovative, equitably distributed and cost-effective adaptation responses to climate change (considering both technological and non-technological green solutions), including the **protection and adaptation of natural resources and ecosystems**.

Potential impacts (costs, risks and benefits, inter-linkages, conflicts and synergies) **of adaptation and risk-prevention policy choices** with other climate and sectoral policies.

Nominated cases: 56, Selected & mapped cases: 20



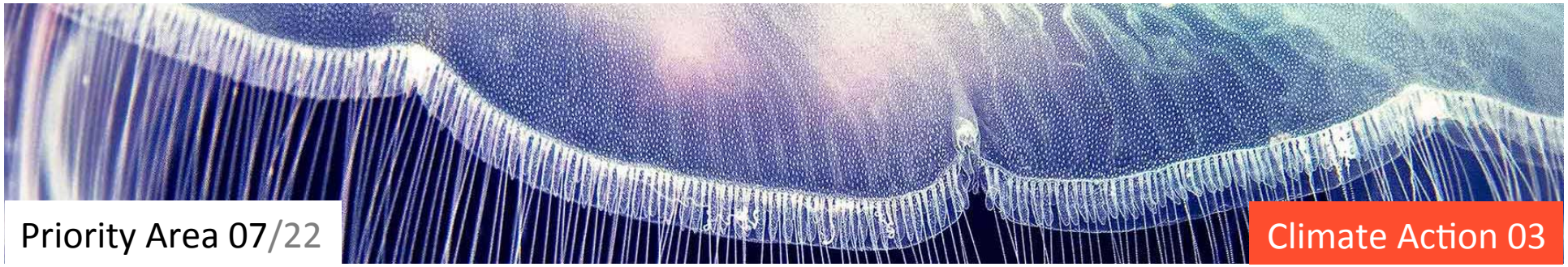
US **Clean Air Make More**

Real-time air monitoring system that immediately notifies citizens of a pollution problem. When pollution rises, it sends messages (email & text alerts) notifying where the pollution hot spot is and what measures citizens can take. Funded by fines.

SL **POSSA**

Super absorbent for safe removal of hydrophobic substances from water surfaces and ground. This includes mineral and synthetic motor oils, lubricants, fuels, cooling liquids, nonpolar organic solvents and fats

CASI

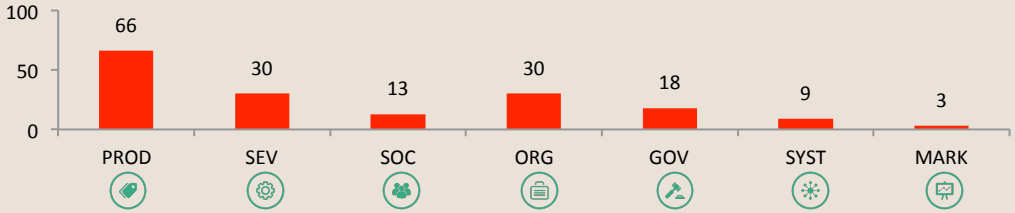


Climate change mitigation solutions

Supporting mitigation policies, including studies that focus on impact from other sectoral policies

Focus in **mitigation policy options and low-carbon technology pathways at different scales** and for the key economic and societal sectors at the EU and global level (considering both technological and non-technological green solutions).

Nominated cases: 169, Selected & mapped cases: 70



UK **North West Bicester - UK's first eco-town**

To build up to 6000 new zero carbon houses and associated facilities and infrastructure to sustain a sustainable community over next 30 years. Houses are designed to maximise sustainability through climate change and resource efficiency.

NL **Local green deals**

Business, government and civil society in the city of Tilburg organized themselves in a network organization based on the so-called local Green Deals. They focus on the joint responsibility of actors to get success on innovation projects.

CASI

Priority Area 08/22

Climate Action 04

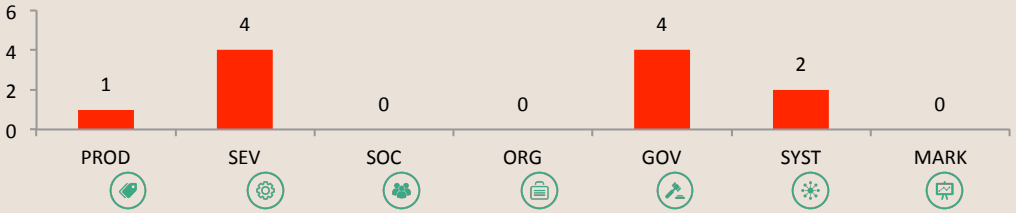
ICT to assess and predict climate actions

Developing comprehensive and sustained global environmental observation and information systems for climate action

Information systems **to monitor, assess and predict the condition, status and trends of the climate**, and **to evaluate low-carbon and climate mitigation and adaptation policies and options** across all sectors of the economy.

Capabilities, technologies and data infrastructures for Earth observation and monitoring must build, space technologies and enabled networks, remotely sensed observations, novel in situ sensors, mobile services, communication networks, participatory web-service tools. Free, open and unrestricted access to interoperable data and information, secure storage, management and dissemination.

Nominated cases: 11, Selected & mapped cases: 4



US **Global Forest Watch**

Online forest monitoring and alert system that empowers people everywhere to better manage forests. It unites satellite technology, open data, and crowdsourcing to guarantee open access to timely and reliable information about forests.

SP **SIPAID – Comprehensive Flood Alarm and Prevention Management System**

Comprehensive solution based on real-time monitoring of different sensors networks and weather forecast to define the risk and impact of floods in Mediterranean regions. It includes alerts and actuation protocols.

CASI

Priority Area 09/22

Climate Action 05

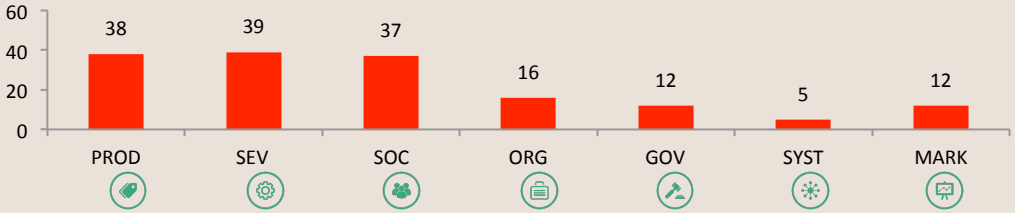
Climate action by sustainable lifestyle

Supporting innovative policies and societal changes based on climate change actions

Research and innovation to address the main **barriers** to societal and market change, aiming **to empower consumers, business leaders and policy makers to adopt innovative and sustainable behaviour**, with contributions from social sciences and humanities.

Tools, methods and models to assess and enable the main economic, societal, cultural and institutional changes needed **to achieve a paradigm shift towards a green economy concerned with climate change.**

Nominated cases: 159, Selected & mapped cases: 83



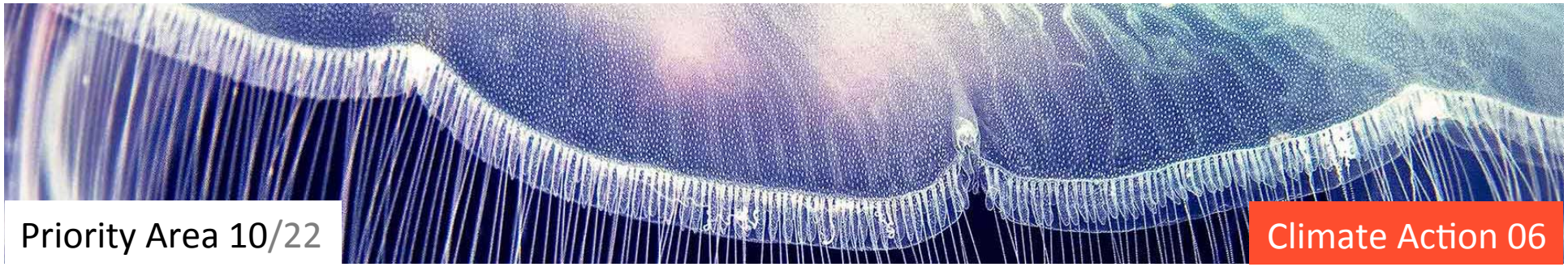
CR **The Green Idea: Facilitating Organic Food Production through Marketing**

To help local organic food producers to reach a wider market and promotion of organic products, including marketing experts in creating public awareness on the importance of organic food.

DK **Transition now**

Platform that promotes action, innovation and a common effort from both politicians and citizens. The network aims at providing opportunity for open interdisciplinary dialogue including large scale seminars, debate cafés and guidelines for citizens.

CASI



Priority Area 10/22

Climate Action 06

Climate action eco-innovation policies

Measuring and assessing progress towards a green economy based on climate change actions

Robust indicators at all appropriate spatial scales that are complementary to GDP, methods and systems **to support and assess the transition towards a green economy** concerned with climate change and the effectiveness of relevant policy options.

New policy instruments to facilitate the transition to a climate change resilient economy.

Nominated cases: 50, Selected & mapped cases: 26

BE **Brownfieldconvenanten**

Private actors and government actors sign a contract to redevelop contaminated or/and deserted land previously used for industrial purpose. These actors cooperate to ease pressure on green fields, to provide space for economic activity, recreation, housing etc.

EU **Environmental Policy Support Tool for Recycling in Islands**

Decision support tool that will allow national authorities and other involved stakeholders to calculate the environmental benefit and financial cost of alternative ways of waste management.

CASI

Raw materials

Priority Area 11/22

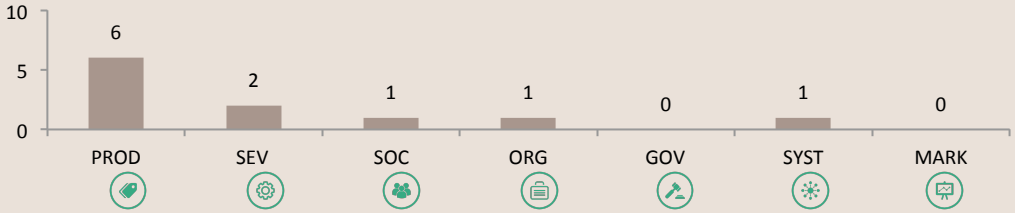
Raw Materials 01

Long-term raw materials availability

Improving the knowledge base on raw materials availability

Assessment of the long-term availability of global and EU resources, including urban **mines** (landfills and mining waste), **coastal-sea** and **deep-sea resources** (e.g. the sea-bed mining of rare earth minerals).

Nominated cases: 11, Selected & mapped cases: 5



UK **National Industrial Symbiosis Program UK**

Platform for businesses to implement resource optimisation and efficiency practices, keeping materials and other resources in productive use for longer. Based on the performance of the UK NISP, improving re-use of raw materials through greater industrial symbiosis across EU could save €1.4bn/ yr

IE **LiDAR**

Technology that uses laser radars to detail the amount of carbon stored in hedgerows. It aims to know how smaller wooded areas contribute to storing carbon.

CASI

Priority Area 12/22

Raw Materials 02

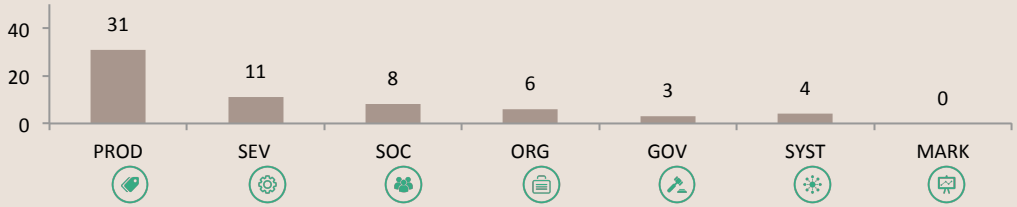
Solutions to explore, extract, process & recycle

Promoting the sustainable supply and use of raw materials, including mineral resources, from land and sea, covering exploration, extraction, processing, re-use, recycling and recovery

Developing and deploying economically viable, socially acceptable and environmentally friendly exploration, extraction and processing technologies for the **efficient use of resources** (mineral resources, from land and sea, urban mines).

New and economically viable and resource-efficient **recycling** and materials recovery technologies, **business models** and processes, including closed-loop processes and systems, including high-quality recycling and recovery, and drastically **reducing resource wastage**

Nominated cases: 63, Selected & mapped cases: 18



SP **WAI**

Technology for transforming agricultural, urban, industrial, and forestry waste into a new eco-material with outstanding mechanical and calorific characteristics. Its mechanical properties make the material very attractive like a substitute of wood and other natural resources, and its calorific features enable the material as an an eco-fuel.

FI **ZenRobotics Recycler**

ZRR sorts metal, wood and stone fractions from waste. It uses visible spectrum cameras, NIR, 3D laser scanners, optic sensors, to create real-time analysis of waste stream and make autonomous decisions.

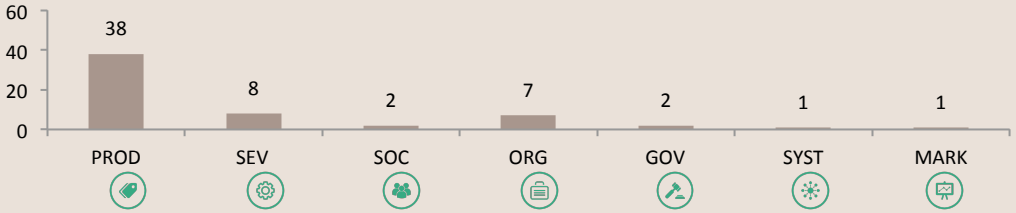
CASI

Alternative raw materials

Finding alternatives for critical raw materials

Sustainable substitutes and alternatives for critical raw materials.

Nominated cases: 59, Selected & mapped cases: 17



US **AIRCARBON**

AirCarbon is a material made by sequestering carbon emissions that would otherwise become part of the air. While almost all plastics today are made exclusively from oil or other fossil fuels, Aircarbon replaces oil with captured air components.

CZ **Czech Nanospider**

Nano-fibres are a thousand times thinner than human hair. They have great potential in many applications and industrial production is the key to their use in environmental protection. The considerable porosity and high surface offer extraordinary options to use in membranes and sensors.

CASI

Awareness on raw materials shortage

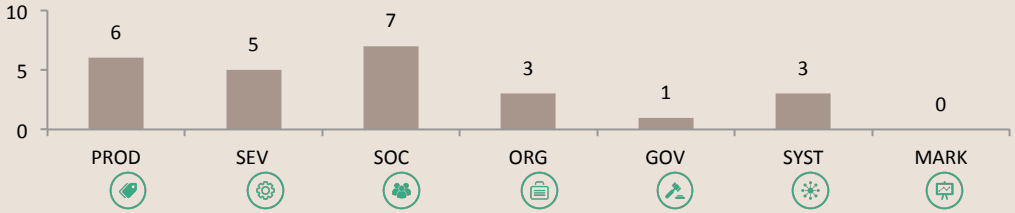
Improving societal awareness and skills on raw materials

Cultural, **behavioural**, **socio-economic**, **systemic** and institutional changes in order to address the growing problem of skills shortage in the raw materials sector: partnerships between universities, geological surveys, industry and other stakeholders.

Development of innovative green **skills**. Increase the awareness of the importance of domestic raw materials.

Structural changes to **empower** citizens, policy-makers, practitioners and institutions.

Nominated cases: 25, Selected & mapped cases: 13



BG **3D Ecobus – Mobile Education Center**

Mobile information-educational centre, equipped with state-of-the-art multimedia tools. The project aims students, employees of companies and Government institutions. Its purpose is to enrich their knowledge/ habits about the separate collection of waste and the benefits for environment and society

SP **AV symbiosis**

Transforming rejected household goods into objects with new functions (second life). Workshops are made in collaboration with NGOs and charities, guiding children through a process whereby they transform these stuff into small pieces of art.

CASI

ICT systems to map raw materials trends

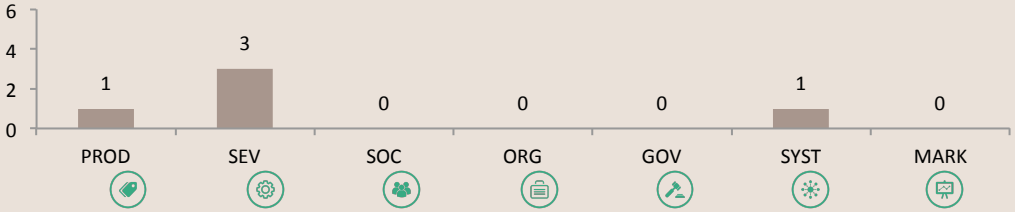
Developing comprehensive and sustained global environmental observation and information systems for raw materials

Information systems to **monitor**, **assess** and **predict** the condition, status and trends of the raw materials.

Capabilities, technologies and data infrastructures for Earth observation and monitoring must build, space technologies and enabled networks, remotely sensed observations, novel in situ **sensors**, **mobile services**, **communication** networks, participatory **web-service** tools.

Free, **open** and **unrestricted** access to interoperable data and information, secure storage, management and dissemination.

Nominated cases: 5, Selected & mapped cases: 1



GE **myECOcost**

Information system that can measure the ecoCost of any product by analysing the resources it requires and then collecting the environmental data from manufacturing, assembling and transport, right to its disposal. Designed to be readable through smartphones or other modern electronic devices,

SL **Trashout**

Trashout is an environmental project aiming to locate illegal dumps. The app helps people to have impact on their environment by reporting illegal dumps that will the appear in the app map. Government and waste agencies thus can take adequate actions.

CASI

Priority Area 16/22

Raw Materials 06

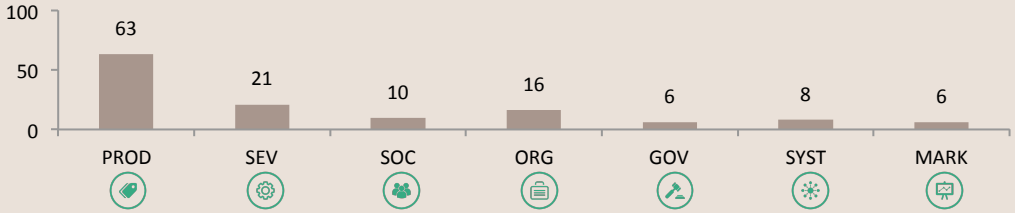
Eco-solutions to reduce raw materials use

Strengthening eco-innovative technologies, processes, services and products, including exploring ways to reduce the quantities of raw materials in production and consumption, overcoming barriers in this context and boosting their market uptake.

All forms of eco-innovation, both incremental and radical, combining technological, organisational, societal, behavioural, business and policy innovation, and strengthening the participation of civil society.

To include **user-driven** innovation, business **models**, **industrial symbiosis**, product service systems, product **design**, full life **cycle** and **cradle-to-cradle** approaches as well as exploring ways to reduce the quantities of raw materials in production and consumption

Nominated cases: 130, Selected & mapped cases: 49



DK **Carlsberg circular community - 'upcycling' system**

Carlsberg joins with global suppliers to develop 'upcycling packaging that reduces reliance on natural resources, while still appealing to consumers. Based on circular economy materials by leveraging Cradle-to-Cradle® innovation and quality

CR **ECO-SANDWICH- Prefabricated Wall Panel Systems Made of Recycled Aggregates**

Ventilated prefabricated wall panel system which utilizes construction and demolition waste (CDW) and mineral wool. Produced using sustainable technology to reduce primary raw material and energy consumption in building stock.

CASI

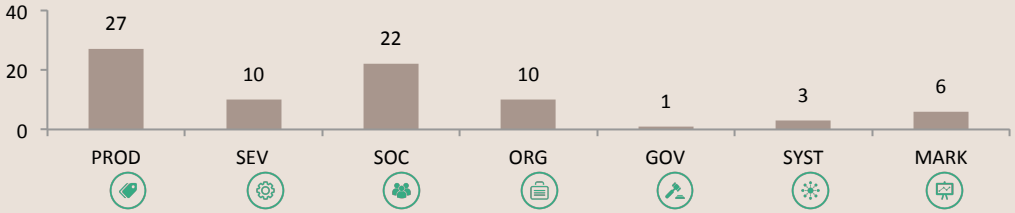
Raw materials conscious sustainable lifestyle

Supporting innovative policies and societal changes based on raw material sustainability actions

Research and innovation to address the main barriers to societal and market change, aiming to **empower** consumers, business leaders and policy makers to adopt innovative and sustainable **behaviour**, with contributions from **social sciences** and **humanities**.

Solutions to promote sustainable **lifestyles**, consumption patterns and user engagement, focusing in raw materials sustainability.

Nominated cases: 79, Selected & mapped cases: 33



IE **SMILE Resource Exchange**

Industrial symbiosis programme for businesses that encourages exchanging of resources between members in order to save money, reduce waste and develop new business opportunities. Potential exchanges are identified through free networking events, a free online exchange facility and a support team.

UK **M&S Sustainable building and learning**

New 'sustainable learning M&S store which integrates all aspects of sustainability and involving customers in the journey. This store was an opportunity to try new things, invest in sustainable innovations – technologies, processes and systems.

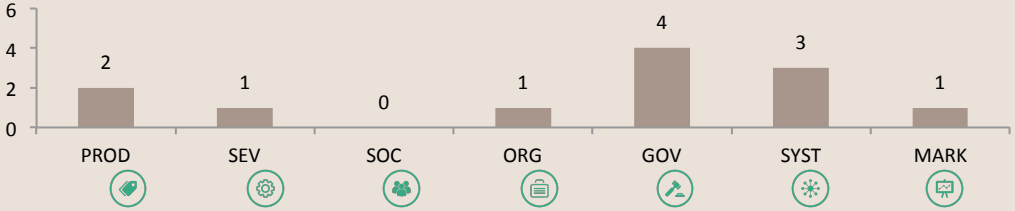
CASI

Effective raw materials policies

Measuring and assessing progress towards a green economy based on raw materials sustainability actions

Robust **indicators**, **methods** and **systems** to support and assess the transition towards a green economy, focusing on the effectiveness of relevant raw materials policy options.

Nominated cases: 12, Selected & mapped cases: 4



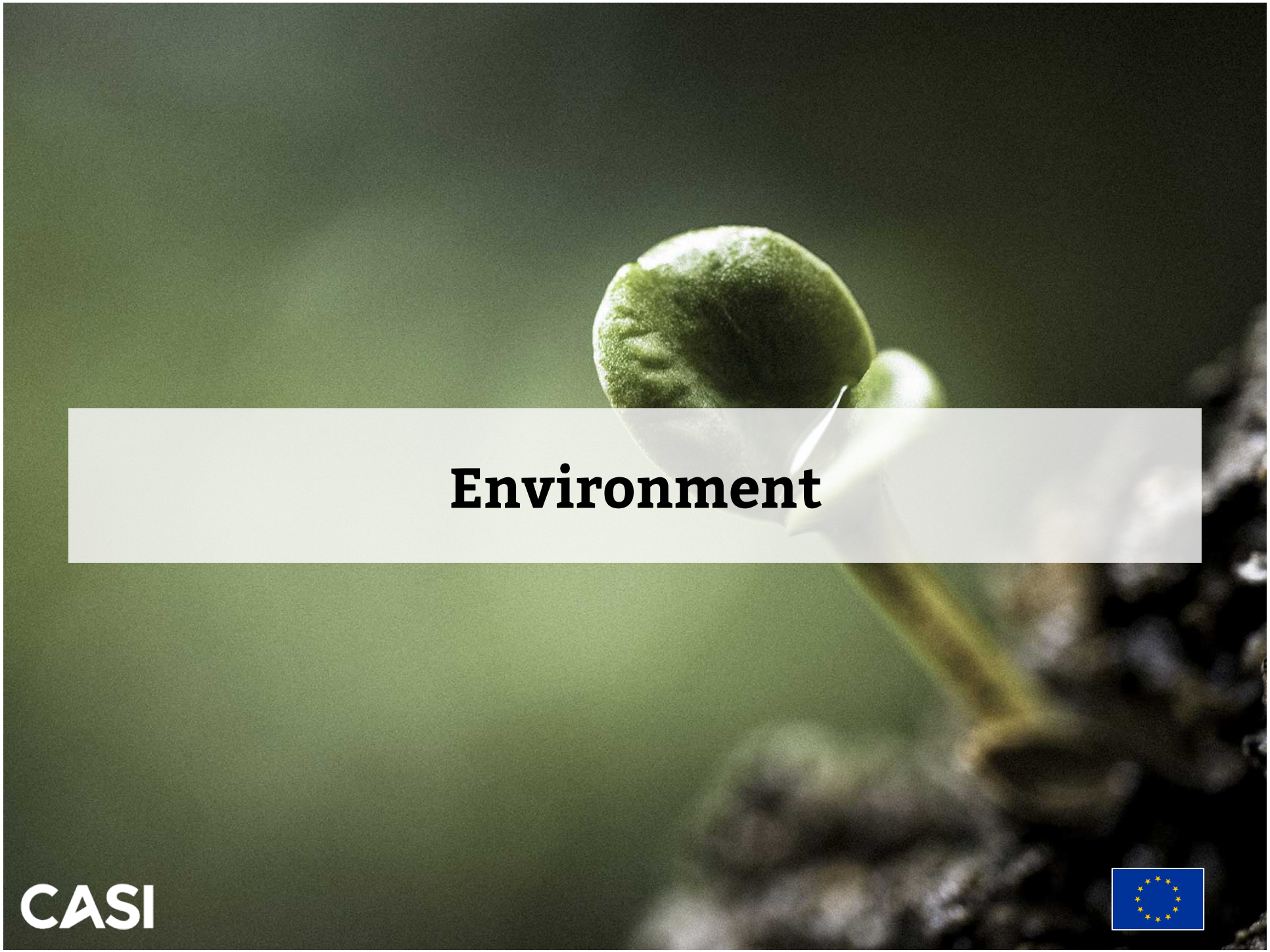
PT **Environmental Product Declaration (EPD)**

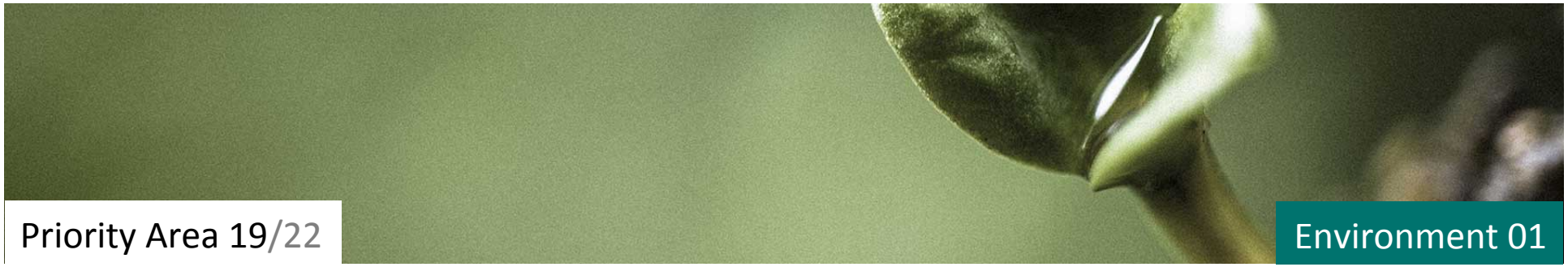
Monitoring system of environmental product declarations (EPD) for products/services of habitat sector. It is a national program allowing companies or entities requesting the development of rules for the Product Category (RCP) regardless their origin country. The registration is checked by independent third parties.

RO **Greenhouse building subsidies**

Public policy funding to encourage individuals and households when building a new house or refurbishing the old one introducing green technologies in houses, e.g. photovoltaic, solar, biomass boilers, etc.

CASI


Environment
CASI



Priority Area 19/22

Environment 01

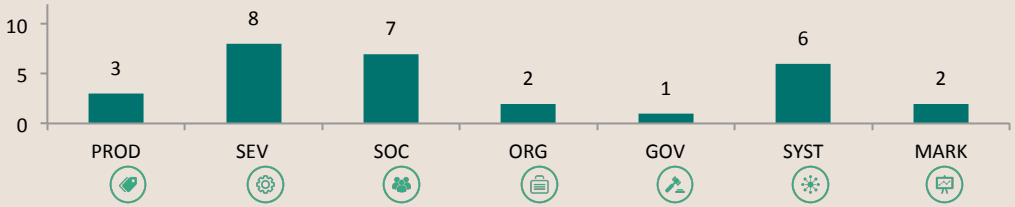
Biodiversity examination and understanding

Furthering our understanding of biodiversity and the functioning of ecosystems, their interactions with social systems and their role in sustaining the economy and human well-being.

To anticipate these risks by **assessing, monitoring and forecasting the impact of human activities on the environment and natural resources** (including water, air, biomass, fertile soils, biodiversity and ecosystems).

To **examine how biodiversity and ecosystems function and react to anthropogenic impacts**, how they can be restored, and how this will affect economies and human well-being.

Nominated cases: 29, Selected & mapped cases: 12



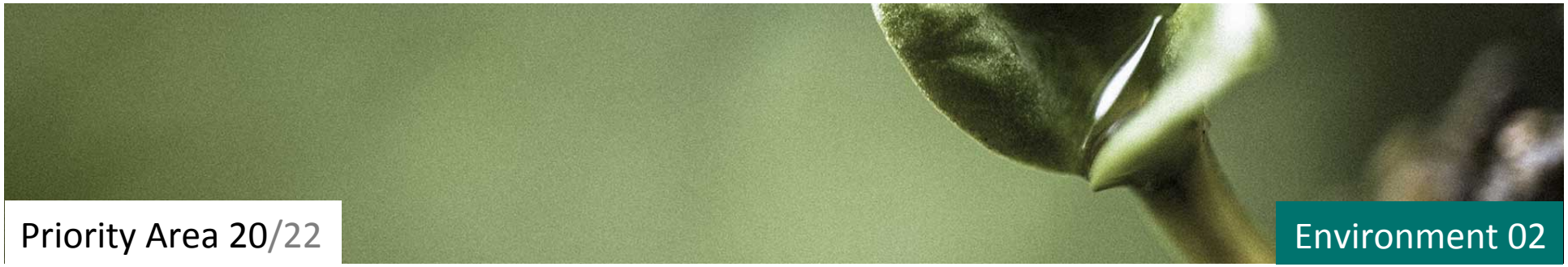
AT **Arche Noah - diversity of cultural plants**

ARCHE NOAH was established in 1990 on the initiative of gardeners, farmers and journalists, concerned with the future of seeds and heirloom varieties. ARCHE NOAH responds to the loss of agro-biodiversity with a positive vision and numerous activities: meetings, published books, workshops, seminars

CY **BIOforLIFE: Cyprus Biodiversity**

Development of a communication campaign with the aim of raising the publics awareness on the subject of biodiversity. The Department of Environment of Cyprus is the Coordinating Beneficiary of the project

CASI



Priority Area 20/22

Environment 02

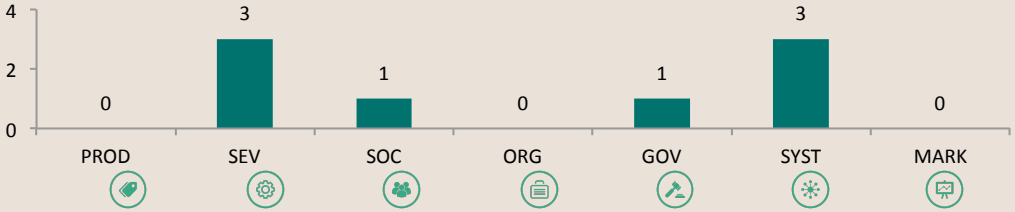
ICT for mapping natural resources and trends

Developing comprehensive and sustained global observation and information systems for environmental trends

Information systems **to monitor, assess and predict the condition, status and trends of the natural resources** (including water, air, biomass, fertile soils, biodiversity and ecosystems).

Capabilities, technologies and data infrastructures for Earth observation and monitoring must build space technologies and enabled networks, remotely sensed observations, novel in situ sensors, mobile services, communication networks, participatory web-service tools. Free, open and unrestricted access to interoperable data and information, secure storage, management and dissemination.

Nominated cases: 8, Selected & mapped cases: 5



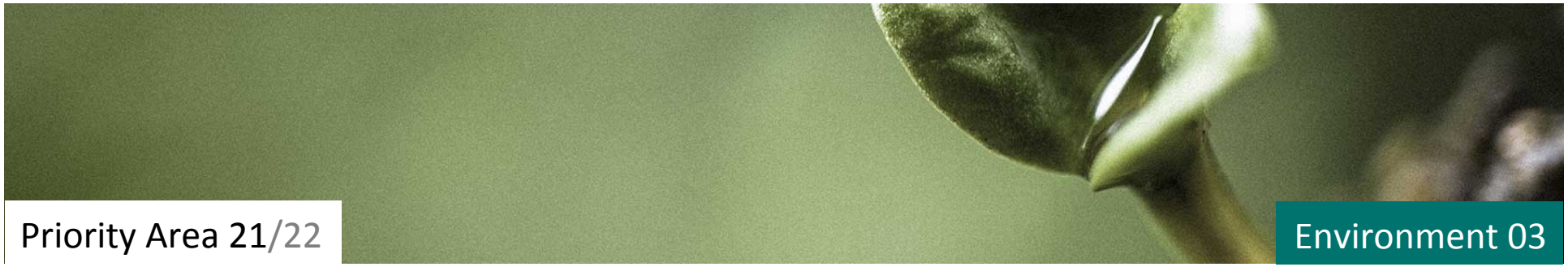
CA **Cybercartography**

Organization, presentation, analysis and communication of spatially referenced information on a wide variety of topics of interest and use to society. One example is the Inuit Sea Ice Use and Occupancy Project (ISIUOP) which investigates the importance, uses, and knowledge of sea ice.

EE **Vital Fields farm management app**

Vital Fields offers web and apps for farm management, weather and plant disease forecasting. It is a cloud-based agricultural early-warning system that helps farmers in plant disease and growth phase modelling, tracking climatic patterns and other farm.

CASI



Priority Area 21/22

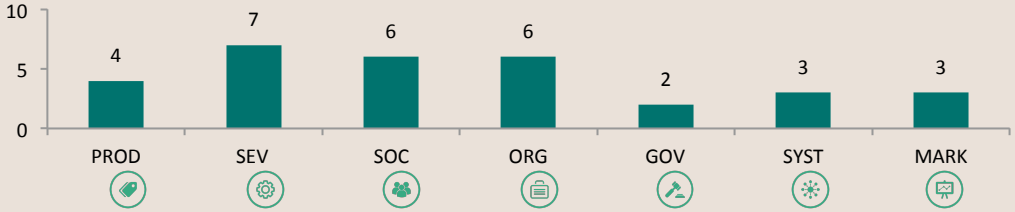
Environment 03

Solutions for cultural heritage assets

Developing adaptation and mitigation innovations for preservation and management of cultural heritage assets.

Innovative solutions, through adaptation and mitigation strategies, methodologies, technologies, products and services for the **preservation and management of tangible cultural heritage in Europe at risk from climate change.**

Nominated cases: 31, Selected & mapped cases: 14



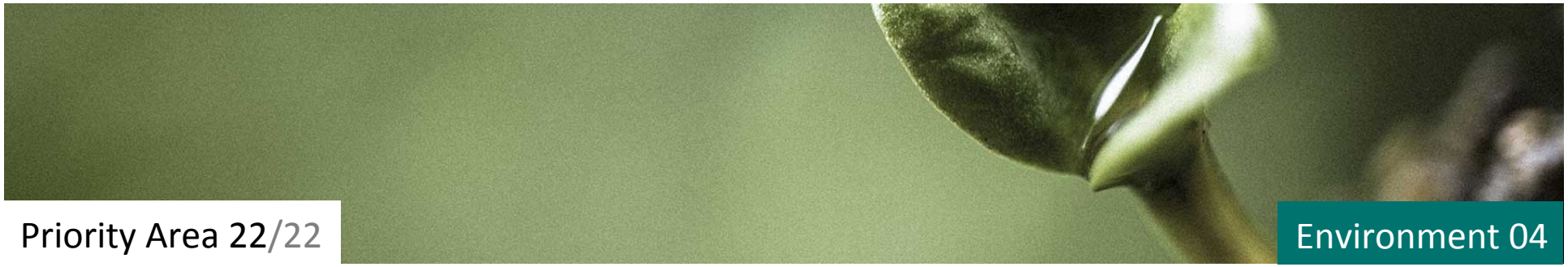
IE **Burren & Cliffs of Moher Geopark**

Geoparks are special regions with outstanding geology and local culture. GeoparkLIFE aims to strengthen the working partnership between local/nat./international champions of conservation, tourism and community to ensure increasing benefits locally. The initiative works on projects that are centred around heritage.

NL **Electrical city shuttles (CargoHopper)**

It replaces large transport vehicles by small electric city transportation in Utrecht. These shuttles are silent electric powered followed by three mini trailers. It saves CO2 emissions and congestion on the canal roads.

CASI



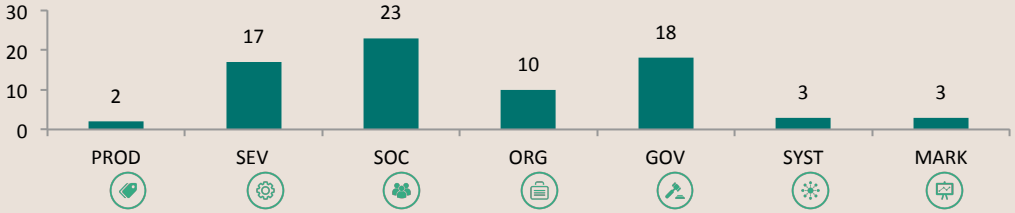
Strategic intelligence & citizens' participation

Providing knowledge and tools for effective decision making and public engagement.

To improve **capacities for forecasting, early warning and assessing vulnerabilities, impacts and risks.**

To provide support for environmental and resource efficiency policies, and options for **effective evidence-based governance**. Innovation to increase policy coherence, resolve trade-offs and manage conflicting interests and to **improve public awareness of research results and the participation of citizens in decision making**.

Nominated cases: 76, Selected & mapped cases: 51



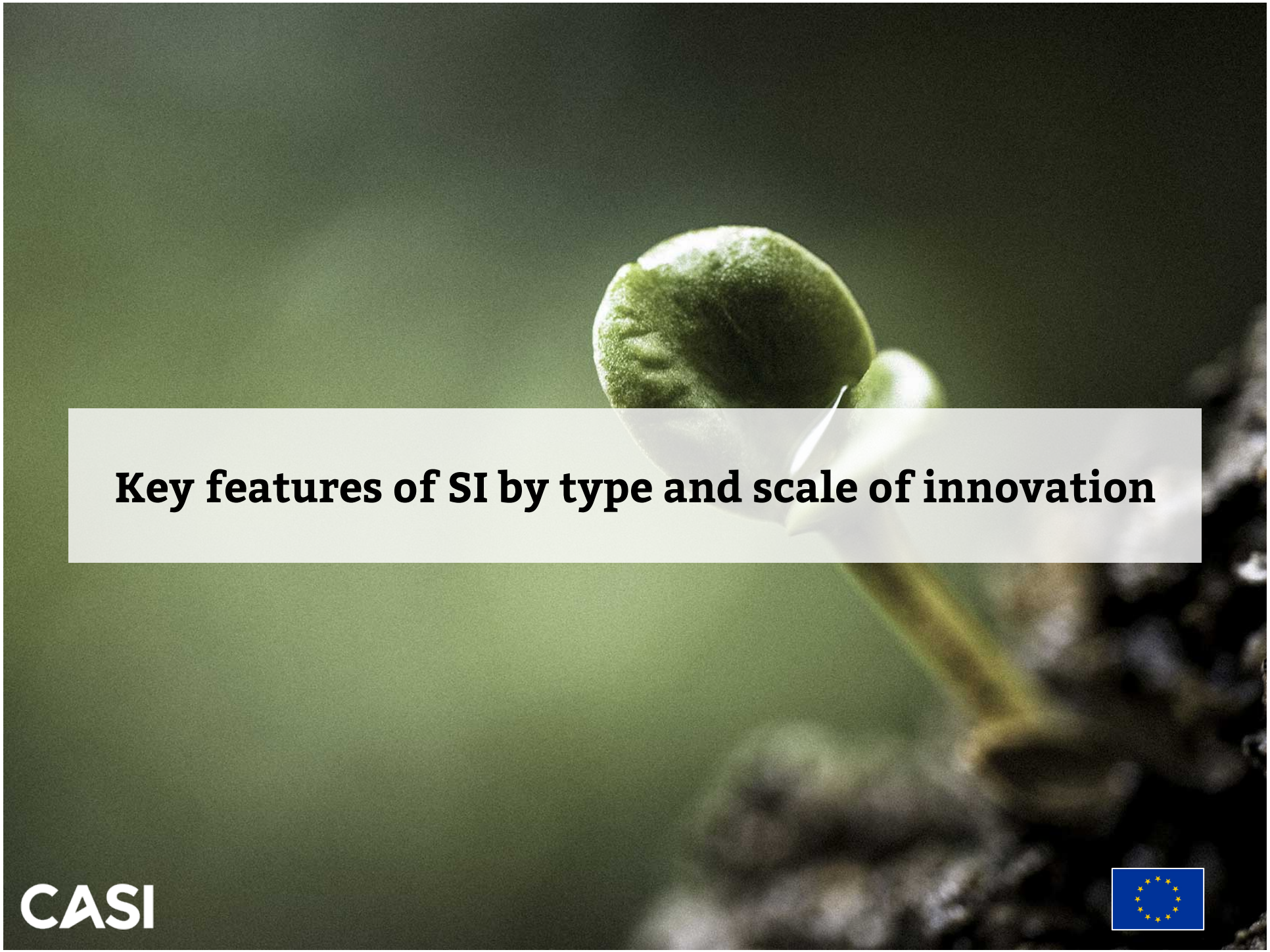
GE **Dorf ist Energie (klug) (Village is Energy (clever)**

Villages in the region of South Westphalia are supported for improving in the field of energy efficiency. Villages apply with a concept and five best ideas are chosen by a jury. The other applicants receive consulting for maturing their ideas. As a result of the process a tool box with best practices.

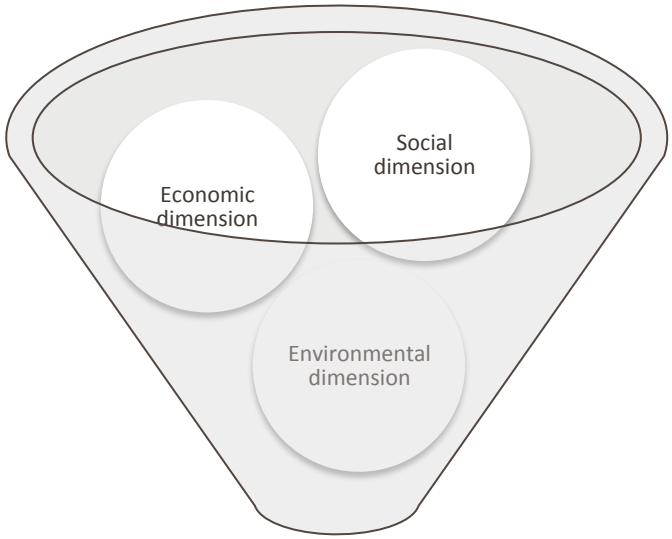
NL **Sustainable Energy Landscape**

In Armoede area there are 15 farms and 60 households ADEL group is investigating how, with today's knowledge, the area can become (as much as possible) climate neutral in 2030.The initiative is formed by a number of themes(expert-supported) focus groups.

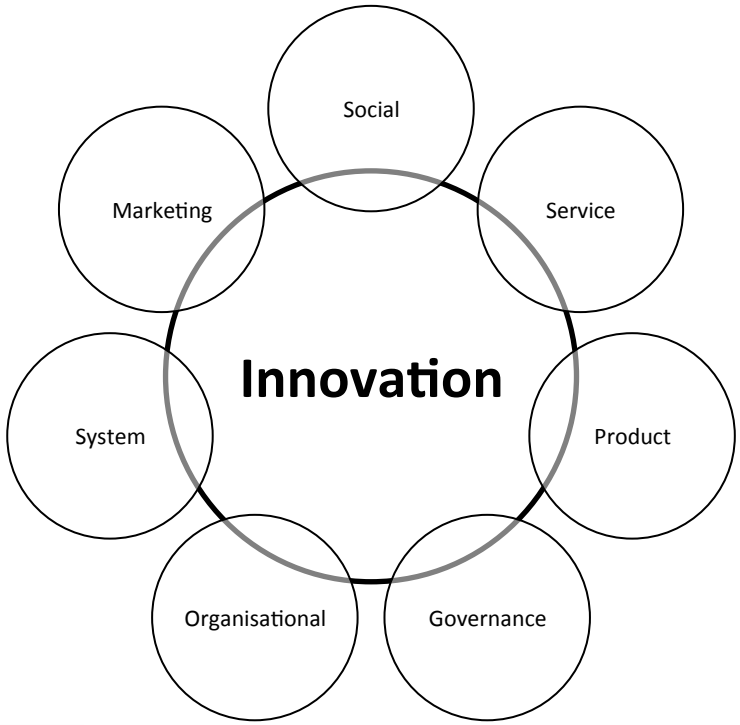
CASI

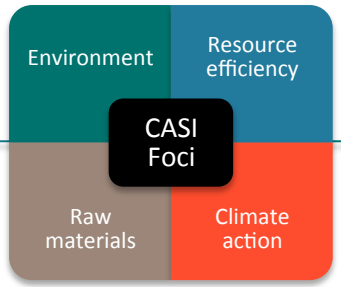

Key features of SI by type and scale of innovation
CASI

Our Sustainable Innovation Foci



Sustainable





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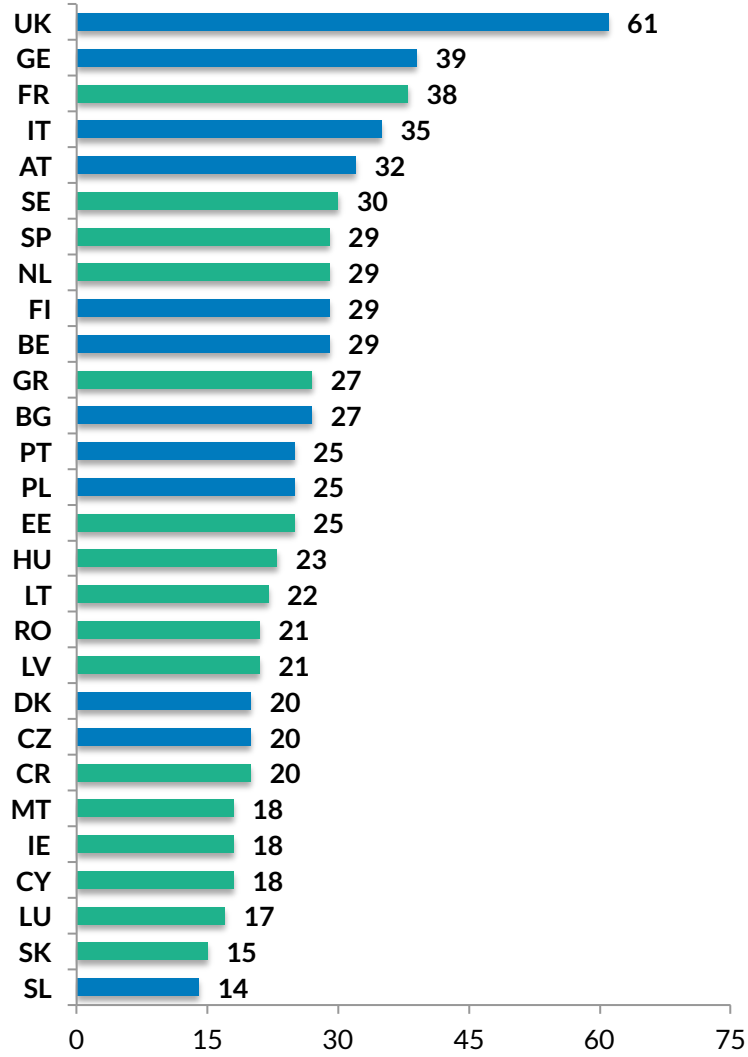
Nominated SI initiatives across the EU

537

537 cases linked to EU28+ countries

cases linked to 12 CASI partners

cases linked to 16 CASI correspondents



CASI

Rating criteria for the selection of SI initiatives

1. **Public participation and Mobilisation**

   Refers to the engagement in the issues of the sustainable innovation by the public/civil society/ democratic governance, with the goal to foster independent thinking and debate, i.e. not corporate market research.

2. **Sustainability and cross-sectoral linkages**

   Refers to the way further innovation or positive effects are enabled on a wide range of sectors, levels, and users.

3. **Multi-dimensional transformations**

   Refers to the degree to which the sustainable innovation can produce positive change or transformation for one or more dimensions.

4. **Deployment and diffusion**

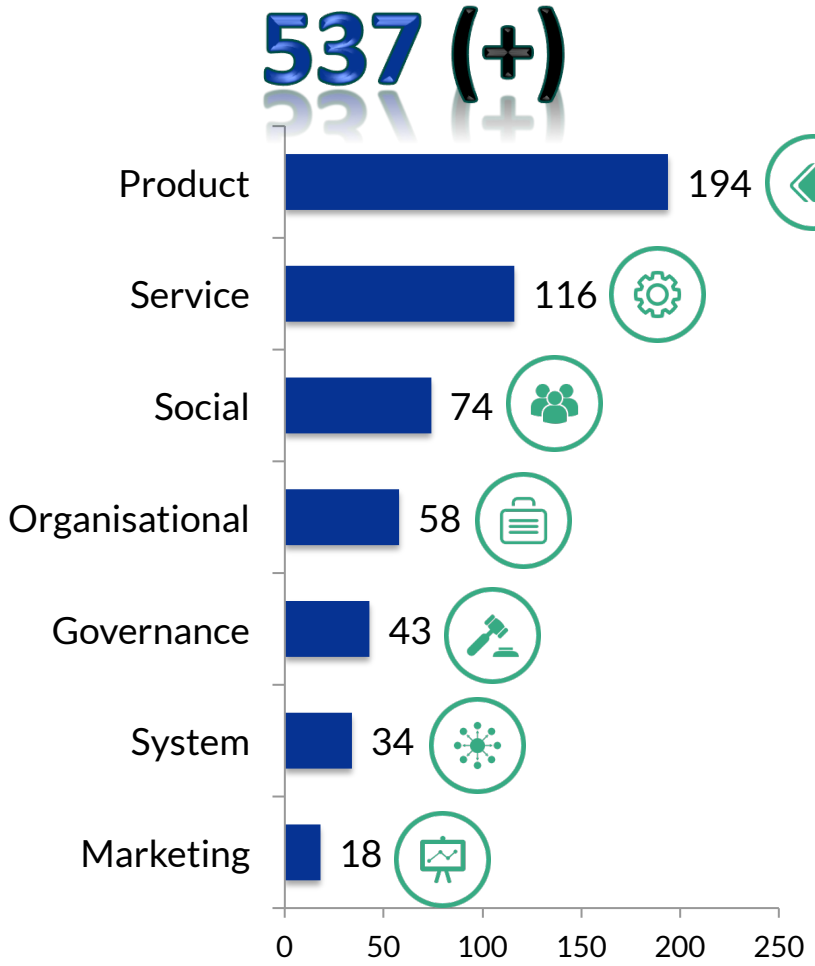
   Refers to the stage of advancement in the process of deployment or implementation.

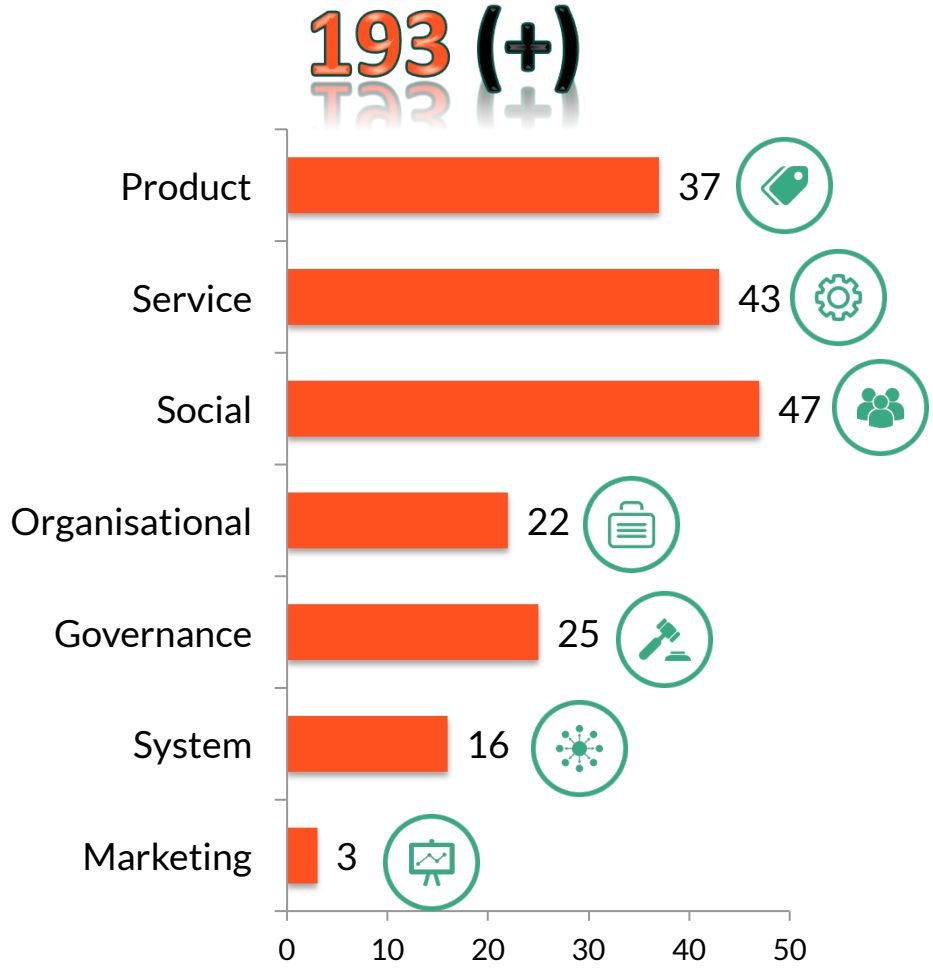
5. **Novelty and originality**

   Refers to the degree to which a sustainable innovation represents an original or novel idea.

CASI

nominated vs. mapped SI initiatives





CASI

7 types of innovations

- SI initiatives studied by CASI addressed at least one of the following types of innovations:

1. **product / process** innovation
2. **service / process** innovation
3. **social / behavioural** innovation
4. **organisational / business model** innovation
5. **governance** innovation
6. **system / paradigm** innovation
7. **marketing / positioning** innovation

CASI

Product / Process innovation

- **Product** innovation is the introduction of a good that is new or significantly improved with respect to its characteristics or intended uses. (OECD, 2005).

- **Process** innovation is the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software. (OECD, 2005).

- CASIPEDIA stats
  - **195** SI initiatives nominated, **38** mapped
  - Top 5 sectors
    - Manufacturing
    - Energy
    - Water
    - Construction
    - Agriculture

Examples

BE **Fairphone**

To produce phones with conflict-free minerals, fair wages and worker representation in manufacturing companies.

SL **Ponnod Prime**

To enable sustainable, premium quality food production through aquaponics using waste heat recovery from the industry.

CASI

Service innovation

- **Service** innovation is the introduction of a service that is new or significantly improved with respect to its characteristics or intended uses.
  - It can include significant improvements in how it is provided (for example, in terms of their efficiency or speed), the addition of new functions or characteristics to existing services, or the introduction of entirely new services (OECD, 2005)

- CASIPEDIA stats
  - **122** SI initiatives nominated, **50** mapped
  - Top 5 sectors
    - Other services
    - Transport
    - ICT
    - Energy
    - Water

Examples

	Kutsuplus - customised public transport		**Hydro Efficiency for Buildings and Public Spaces Project**
FI	To take people from door to door for low fares using a smart, demand responsive intelligent bus.	PT	To promote water efficiency in the buildings and public spaces through improved water management.

CASI

Social innovation

- **Social** innovation is a new solution that simultaneously meets a social need and leads to new or improved capabilities, assets and/or relationships (see Caulier-Grice et al, 2012).
  - Such innovative solutions are often developed and diffused through organisations whose primary purposes are social (see also Mulgan et al., 2007)

- CASIPEDIA stats
  - **76** SI initiatives nominated, **48** mapped
  - Top 5 sectors
    - Education
    - Other services
    - Agriculture
    - Health/Social services
    - Water

Examples

AT **R.U.S.Z Reparatur- und Service-Zentrum**

To provide education and jobs to unemployed people, and reducing waste by repairing old electrical appliances/ machines.

BG **3D Ecobus – Mobile Education Center**

To inform people about the benefits and necessity of selective collection of packaging waste.

CASI

Organisational innovation

- **Organisational innovation** is the implementation of a new method in business practices, workplace organization or external relations to increase performance by:
  - reducing administrative costs or transaction costs,
  - improving workplace satisfaction (and thus labour productivity),
  - gaining access to non-tradable assets (e.g. non-codified external knowledge) or
  - reducing costs of supplies (OECD, 2005)
- **Business model innovation** refers to new ways of providing product or service offerings to customers and end users that were not previously available.

- CASIPEDIA stats
  - **61** SI initiatives nominated, **22** mapped
  - Top 5 sectors
    - Energy
    - Transport
    - Manufacturing
    - Agriculture
    - ICT

Examples

DE **Fifty-Fifty School**

To offer schools 50% of their energy costs saved through conscious usage to be used at their discretion.

UK **Bath and West Community Energy**

To use Community Shares to raise crowd-funding for community energy projects that respond to climate change threats.

CASI

Governance innovation

- **Governance** innovation implies new forms of citizen engagement, new democratic institutions, new public and user participation in service design and delivery, and the use of public boards to govern particular choices.
- They include new political arrangements in local and national governments as well as changes in the organizational form and arrangements for the planning and delivery of public services (Hartley, 2005)

- CASIPEDIA stats
  - **44** SI initiatives nominated, **25** mapped
  - Top 5 sectors
    - Energy
    - Public administration
    - Water
    - Manufacturing
    - Agriculture

Examples

BE **Energybook**

To promote energy savings in schools by developing cooperatives in which citizens invest in more sustainable neighbourhoods.

PT **Participatory budget**

To promote citizens' participation in municipal investments supporting, among others, sustainable actions.

CASI

System innovation

- **System** innovation is a set of interconnected innovations, where each is dependent on the other, with innovation both in the parts of the system and in the ways that they interact (Caulier-Grice et al, 2012).
  - This is rarely achieved through a single organisation or sector, but involves a complex interaction of public policy and reforms to legislation, changes to business cultures and practices, as well as shifts in consumer attitudes and behaviour.
- **Paradigm** innovation implies changes in the underlying mental models which frame what organizations or communities do (Tidd et al, 2005)

- CASIPEDIA stats
  - **31** SI initiatives nominated, **16** mapped
  - Top 5 sectors
    - Energy
    - Construction
    - ICT
    - Agriculture
    - Water

Examples

BG **Passive house kindergarten**

To use the passive house approach to building/ construction projects with high environmental standards.

LU **The Hollerich Village**

To turn an ex-industrial site into pilot demonstrating how sustainable development can be delivered in practice by creating an eco-district.

CASI

Marketing innovation

- **Marketing** innovation is the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing.
- Marketing innovations are aimed at better addressing customer needs, opening up new markets, or newly positioning a firm's product on the market, with the objective of increasing the firm's sales (OECD, 2005)

- CASIPEDIA stats
  - **19** SI initiatives nominated, **5** mapped
  - Top 5 sectors
    - Manufacturing
    - Retail
    - Agriculture
    - Accommodation & Food
    - Health/Social services

Examples

CR **The Green Idea**

To use marketing knowledge to help local organic food producers and promote organic food production in Croatia .

UK **EcoVerified**

To offer an ecolabel that certifies products and services for being eco-friendly in cooperation with universities.

CASI

Stakeholders' involvement in **designing/developing SI**

Stakeholders' involvement in designing/developing the SI	BUS	CSO	RES	GOV	EU	NSA
Social SI (47 cases)	53%	83%	62%	38%	26%	60%
Services SI (43 cases)	79%	51%	49%	53%	40%	30%
Product SI (37 cases)	81%	22%	73%	57%	38%	19%
Governance SI (25 cases)	60%	80%	44%	72%	36%	48%
Organisational SI (22 cases)	68%	59%	45%	55%	45%	18%
System SI (16 cases)	81%	56%	63%	88%	56%	31%
Marketing SI (3 cases)	100%	67%	33%	67%	33%	33%

- **All actors participate** in the design and development of SI.
- Role of **government and business** actors is highlighted for System SI, i.e. to generate innovation which combine several SI types.
- Role of **research/education** actors key for Product SI.
- Role of **CSO** actors as expected, crucial for Social and Governance SI.

CASI

Stakeholders' involvement in **using/benefiting from SI**

Stakeholders' involvement in using/benefiting from the SI	CSO	BUS	RES	GOV	EU	NSA
Social SI (47 cases)	98%	68%	70%	55%	49%	68%
Services SI (43 cases)	88%	81%	49%	60%	49%	30%
Product SI (37 cases)	81%	84%	76%	51%	62%	27%
Governance SI (25 cases)	92%	76%	68%	64%	48%	24%
Organisational SI (22 cases)	73%	82%	64%	59%	59%	23%
System SI (16 cases)	88%	94%	69%	81%	50%	31%
Marketing SI (3 cases)	100%	100%	67%	67%	67%	67%

- **CSO** and **Business** actors are the most able to exploit the potential benefits of various SI types.
- **Research/education** actors are the third most active users/beneficiaries of most SI types, especially Product SI.
- **Government** actors are among the top users of System SI.
- **EU** use of 50-60% of SI could reflect the wider social / environmental objectives of many SI cases.

CASI

Mutual learning processes

Mutual learning processes	Soc SI (47)	Ser SI (43)	Pro SI (37)	Gov SI (25)	Org SI (22)	Sys SI (16)	Mar SI (3)
Learning-by-doing/interacting	96%	74%	84%	76%	68%	81%	67%
Capacity building / Training / Tutorials	83%	70%	62%	60%	73%	63%	0%
Conferences / Seminars	57%	63%	68%	52%	64%	81%	33%
Networking events	68%	63%	57%	48%	64%	63%	67%
Web 2.0 interactions	77%	53%	57%	64%	41%	63%	67%
Prototyping / Piloting	47%	42%	86%	36%	64%	88%	33%
Stakeholder workshops	57%	67%	43%	52%	36%	75%	67%
Collaborative research	45%	42%	73%	36%	41%	75%	33%
Stakeholder interviews	45%	42%	51%	32%	27%	38%	33%

- **Learning-by-doing** is the most used mutual learning process across all SI types.
- **Capacity building, training courses and tutorials** are widely used by most SI, especially Social, Services and Organisational SI.
- **Conferences and Seminars** are common learning tools, particularly for System SI.
- **Web 2.0 interactions** and social networking are powerful for Social and Governance SI.
- **Prototyping/Piloting** is key for both Product and System SI.

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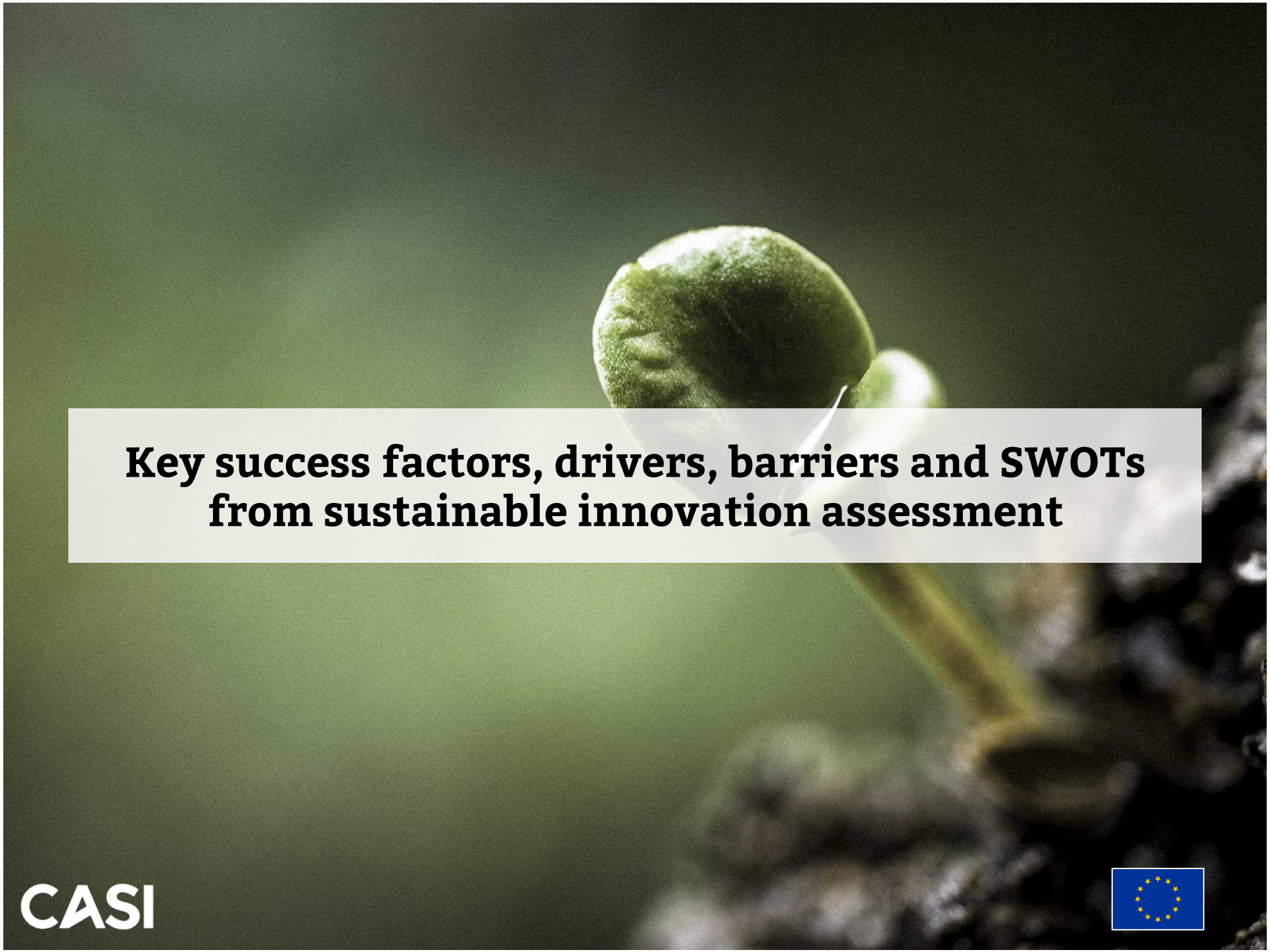
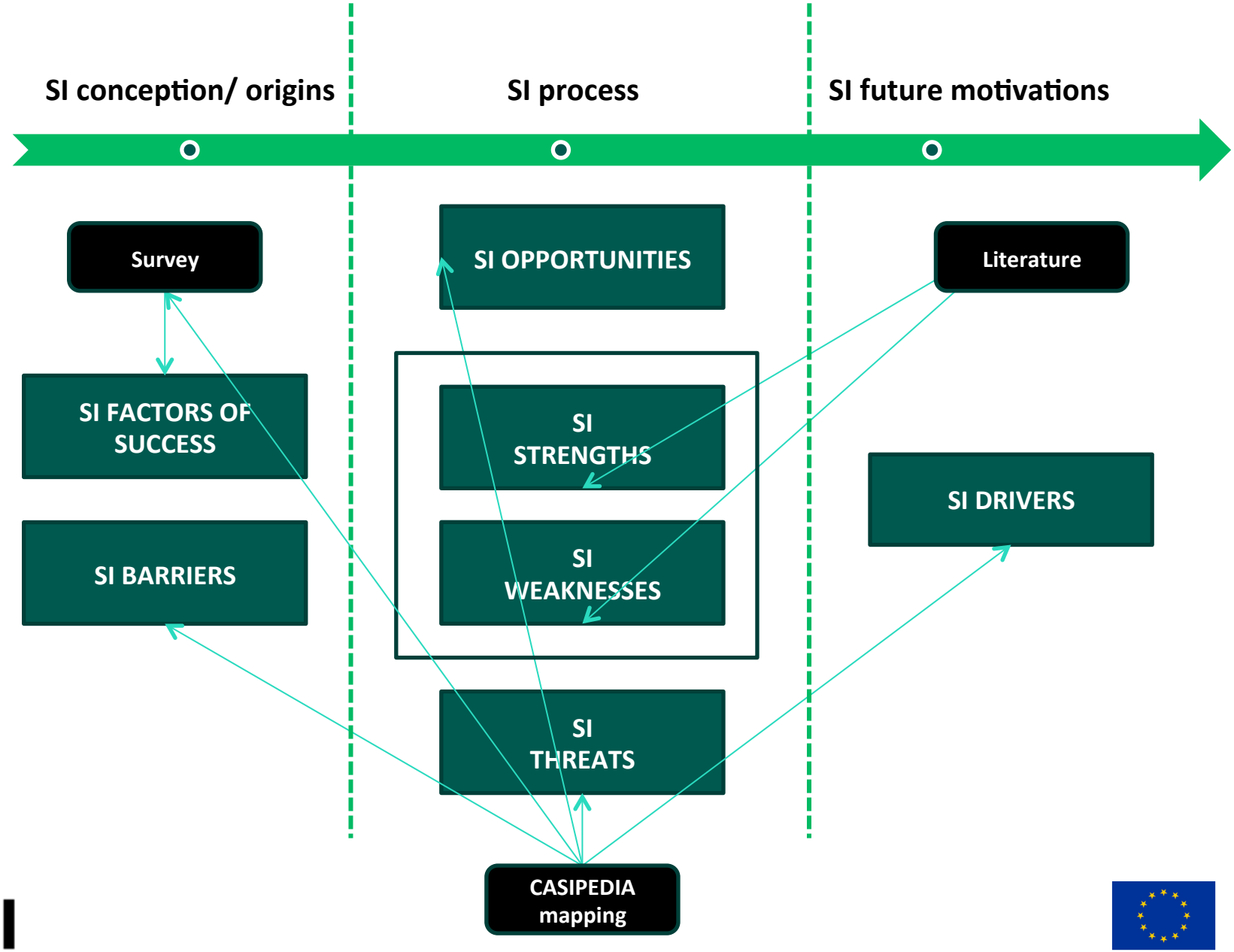
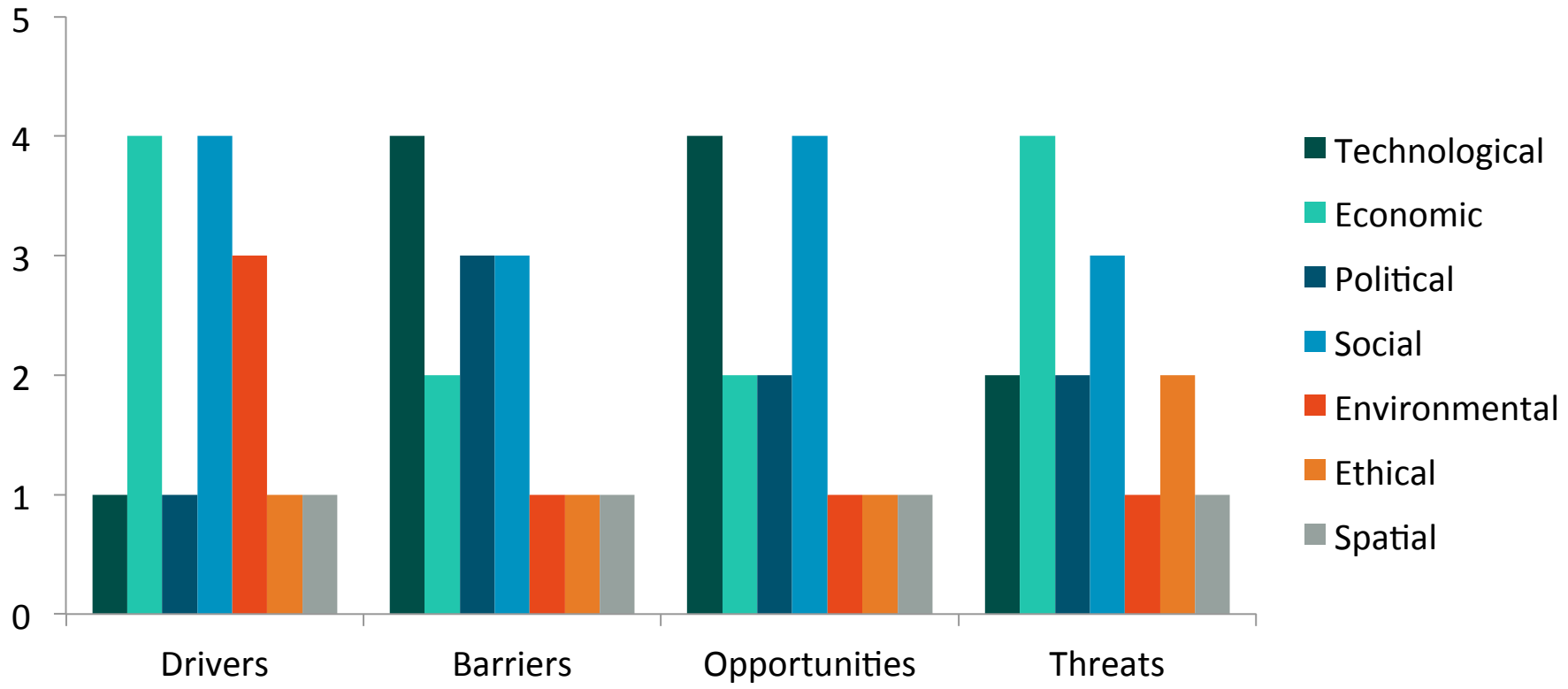

Key success factors, drivers, barriers and SWOTs from sustainable innovation assessment
CASI


SI conception/ origins
SI process
SI future motivations
Survey
SI FACTORS OF SUCCESS
SI BARRIERS
SI OPPORTUNITIES
SI STRENGTHS
SI WEAKNESSES
SI THREATS
Literature
SI DRIVERS
CASIPEDIA mapping

Drivers, barriers, opportunities and threats



Number of key barriers, drivers, opportunities and threats elicited from CASIPEDIA mapping

CASI

SI Drivers

Economic	•Economic benefits •Cost reduction •Local development & employment •Self-employment
Social	•Poverty •Social inclusion •Human health •Welfare and security
Environmental	•Climate change •Environment fragility •Energy sustainability
Political	•Alignment with policy agenda
Technological	•Technology development path & technical interest/ capabilities
Ethical	•Responsible research and innovation
Spatial	•Demographic/ spatial pressures

CASI

SI Barriers

Economic	•High initial investment •Resources scarcity
Social	•Coordination of multiple actors & interests •Users and government's scepticism by lack of understanding •Social resistance to change
Political	•Inadequate regulation •Bureaucracy •Political inertia & resistance to changes
Technological	•Not developed supporting infrastructures •Technical complexity and standards compliance •Dependency of other technologies •IP rights costs
Environmental	•Complexity of environmental impact measuring
Spatial	•Historic & heritage restrictions
Ethical	•Cultural change

CASI

SI Opportunities

Social	•Enthusiasm and motivation •Knowledge transferring mechanisms •Partners' awareness/alignment and networks support •Public participation
Economic	•Financial stability and support •Market needs and gaps
Environmental	•Waste up-cycling alternatives
Technological	•Technical capabilities and technological vision •Digitalisation and IT agenda •Curiosity and creativity •User friendliness
Political	•Favourable regulation changes •Political support
Spatial	•Rural spaces/ traditions attractiveness
Ethical	•Society values aligned with sustainability

CASI

SI Threats

Economic	•Lack of adequate business model to face competition •Incapacity to meet demand •Economies of scale constraints •Conformism: abandoning R&I activity
Social	•Dependency of volunteering •Sustainability of beneficiaries' awareness •Inefficient social impact assessment
Political	•Government priorities change •Collision with vested interests
Technological	•Breakdowns and maintenance issues •Risk of imitation
Environmental	•Ecological collateral effects
Spatial	•Unfavourable location for business continuity/experimentation
Ethical	•Users' exclusion •Questioning corporative SI rationales

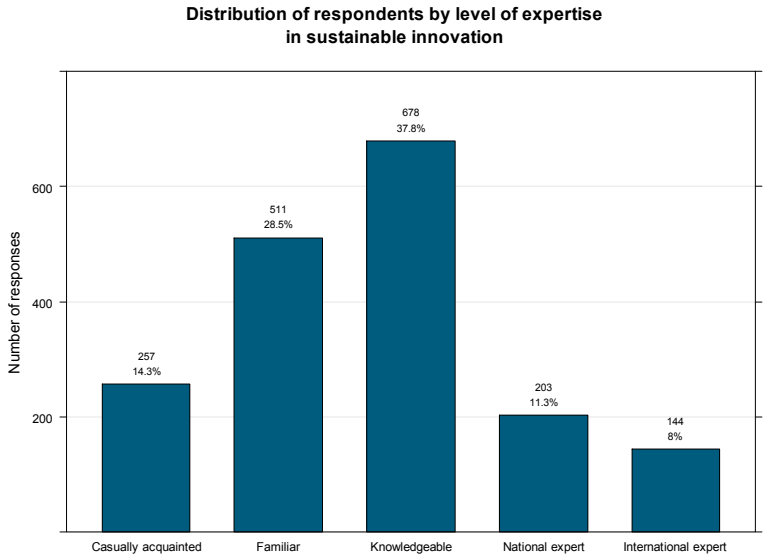
CASI

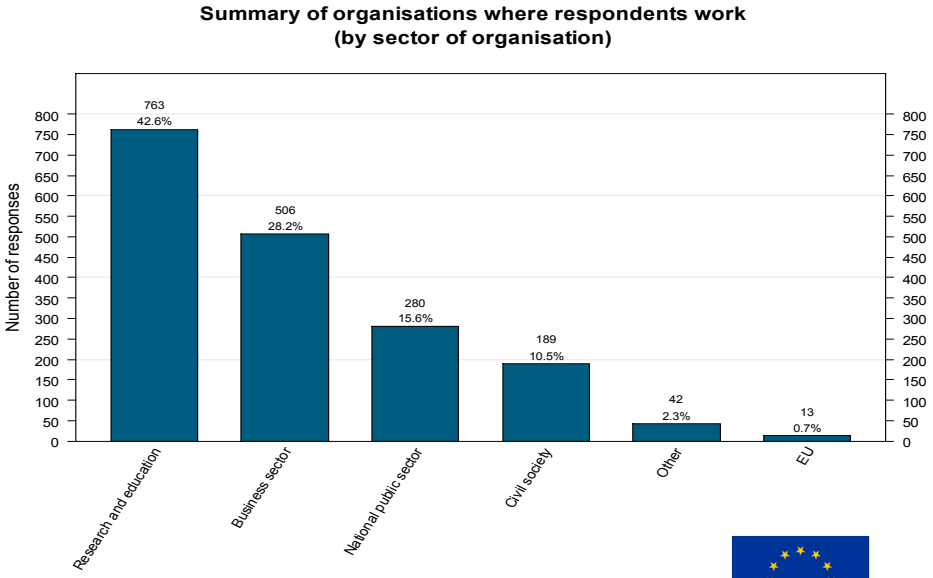
Survey

On line survey conducted from June 11th 2015 over 79 days
Received a total of 1793 responses
(an average of 62,3 responses per country)

FACTORS OF SUCCESS

- Support from national government
- Energy efficiency and/or energy cost-savings
- Awareness/concern about sustainability and/or the environment
- Support from local or regional government
- Cross-sectoral collaboration (i.e. public-private)
- Improved living environment and infrastructure
- Opportunities for employment, job creation
- Highly likely positive environmental impact
- Clean technology
- Citizen concern about environmental & climate issues





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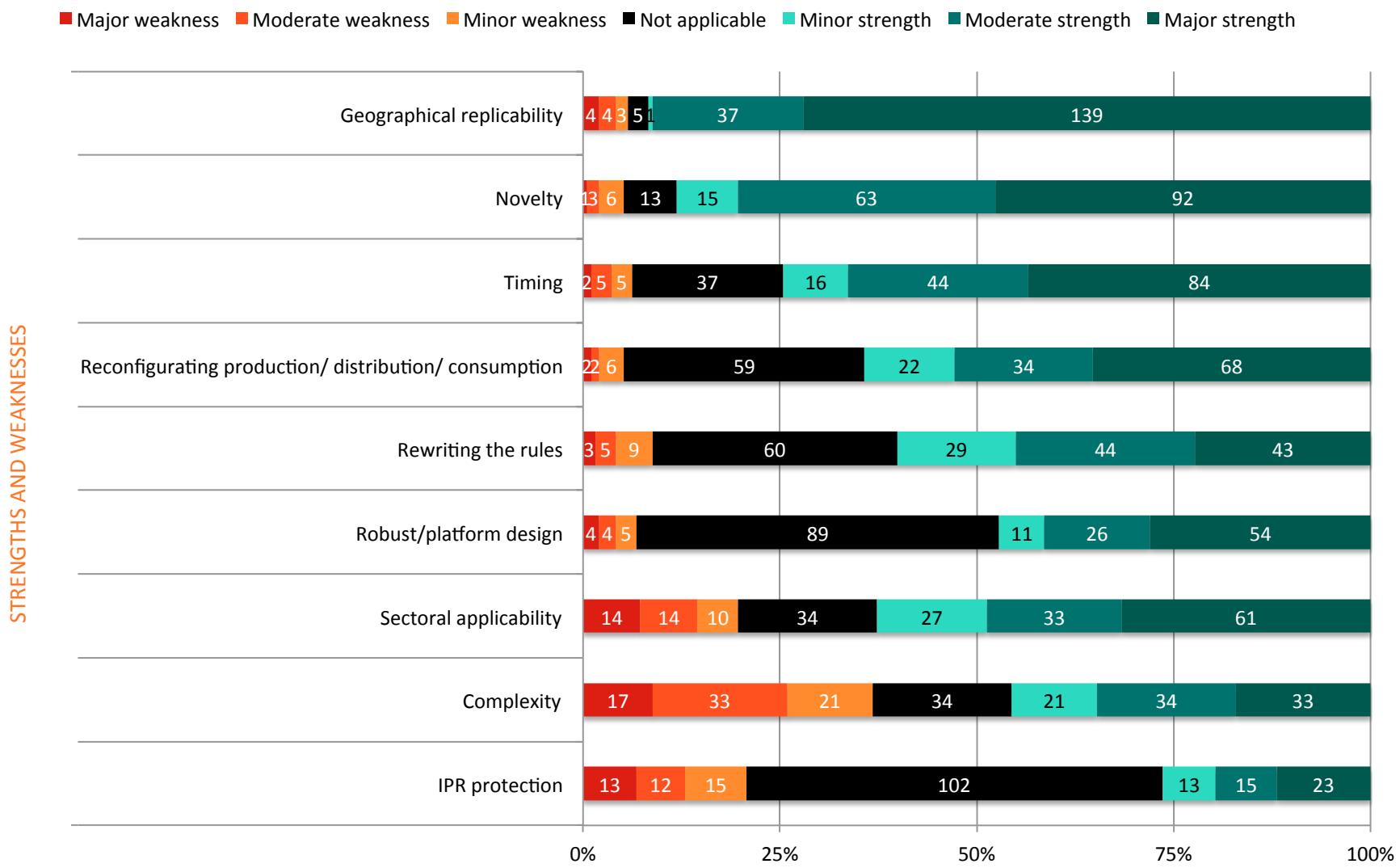
SI Literature



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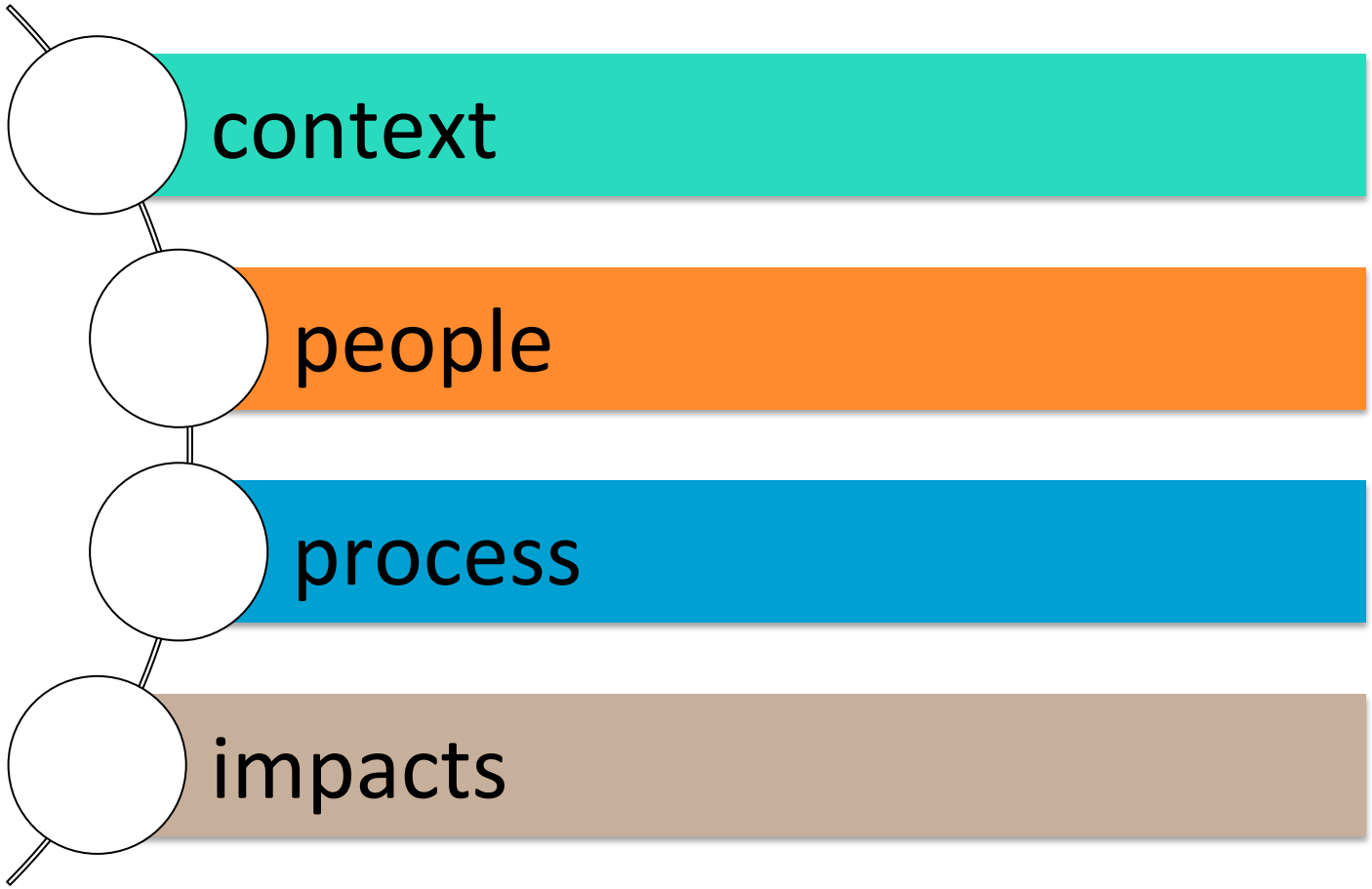
Pre-piloting the **SI Initiatives Track** of CASI-F
CASI

Key Dimensions of SI management



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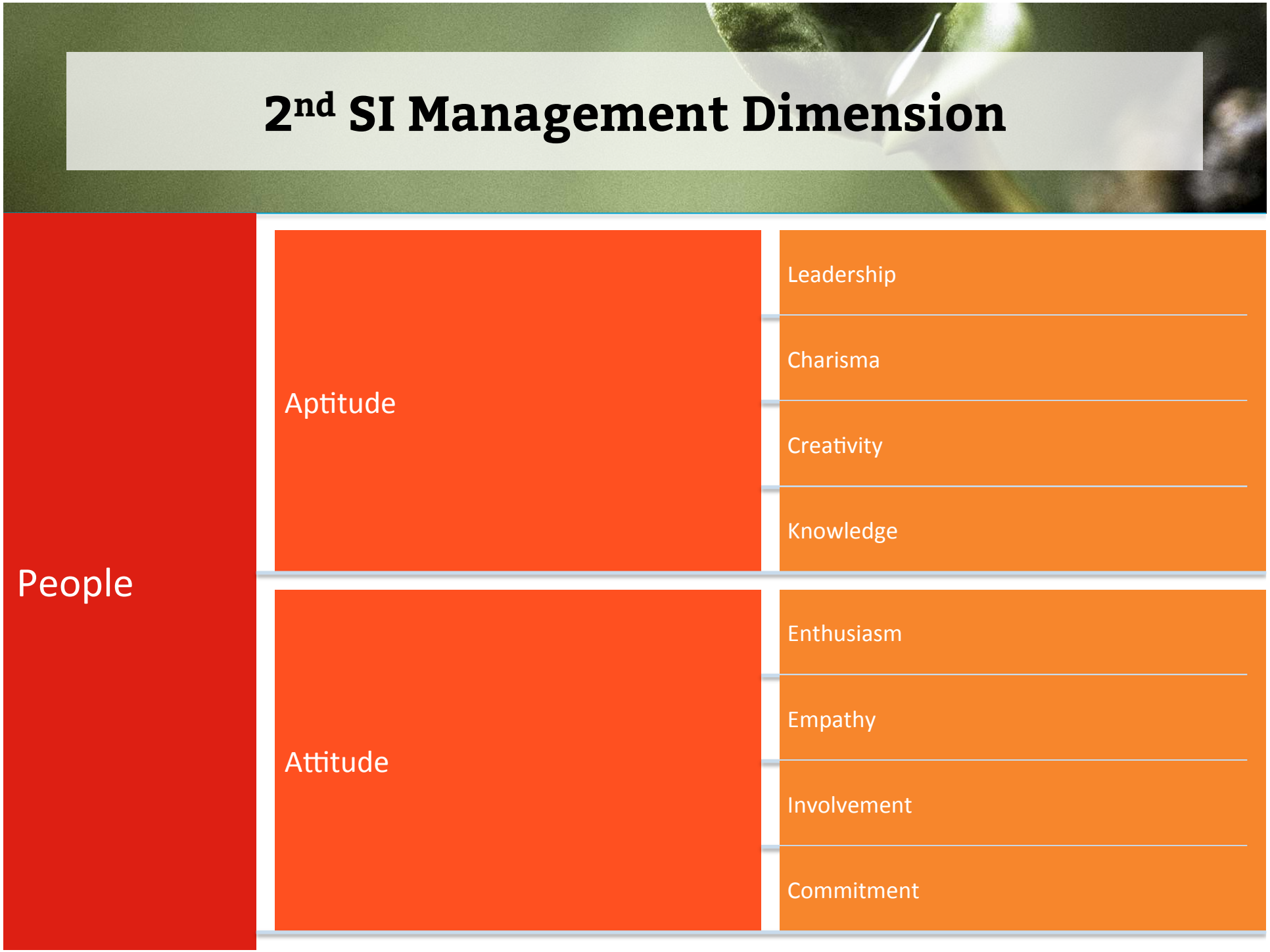
1st SI Management Dimension

Context	Momentum	Political setting
		Exemplars
		Problems
	Foresight	Horizon scanning
		Strategic targets
		Trends
	Resources	Geographical setting
		Funding sources
		Infrastructure
		Data sources
		Scalability
	Mobilisation	Public participation
		Community support
		Institutional support
		Champions and facilitators
		Public-Private Partnerships
		Research and education engagement

2nd SI Management Dimension

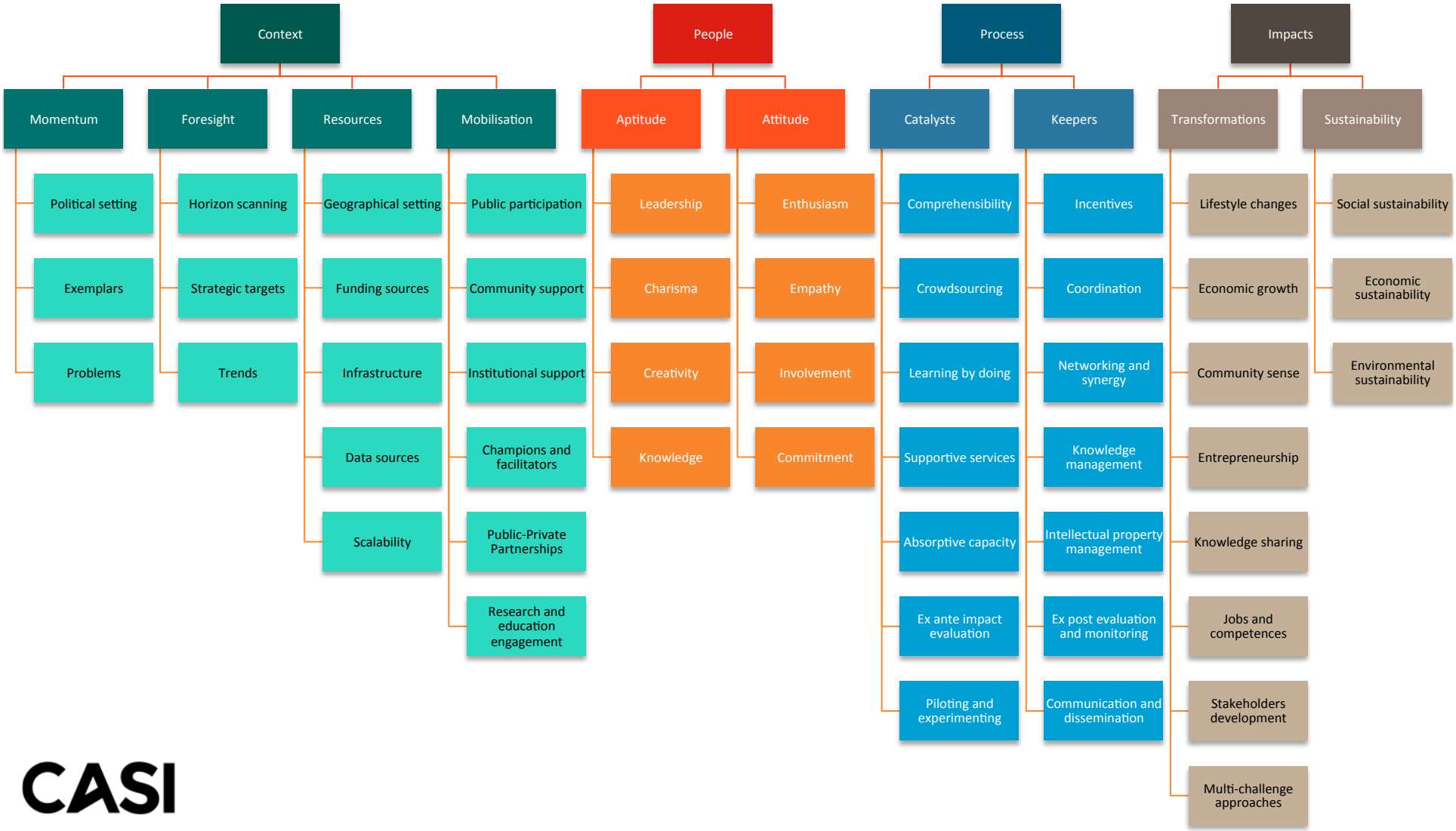


3rd SI Management Dimension

Process	Catalysts	Comprehensibility
		Crowdsourcing
		Learning by doing
		Supportive services
		Absorptive capacity
		Ex ante impact evaluation
		Piloting and experimenting
	Keepers	Incentives
		Coordination
		Networking and synergy
		Knowledge management
		Intellectual property management
		Ex post evaluation and monitoring
		Communication and dissemination

4th SI Management Dimension

Towards a SI conceptual framework



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Conclusions 1 of 2

- Horizon 2020 has provided a baseline for CASI priorities conceptualisation
  - Lessons from SI practices
  - Lessons from SI players
  - Lessons from SI outcomes
- CASIPEDIA analysis may contribute to:
  - Develop a framework for sustainable innovation management and assessment
  - Reveal research and innovation new priorities to be addressed/ formulated in H2020 new stages/ calls
  - Conduct gap-analysis to inform SI policy-makers on stakeholders' SI conception differences, as well as to initiate debates on SI tensions and dilemmas

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Conclusions 2 of 2

- CASIPEDIA provides a broad collection of empirical evidences to support investigation on SI management
- SI literature review and SI survey results have proved useful to confirm/ complement lessons elicited from CASIPEDIA
- The combination of CASIPEDIA, SI literature and SI stakeholders' survey has facilitated the definition of SI common considerations
- These common considerations may be acknowledged by sustainability innovators in order to better address technological, economic, political, social, environmental, ethical and spatial decisions

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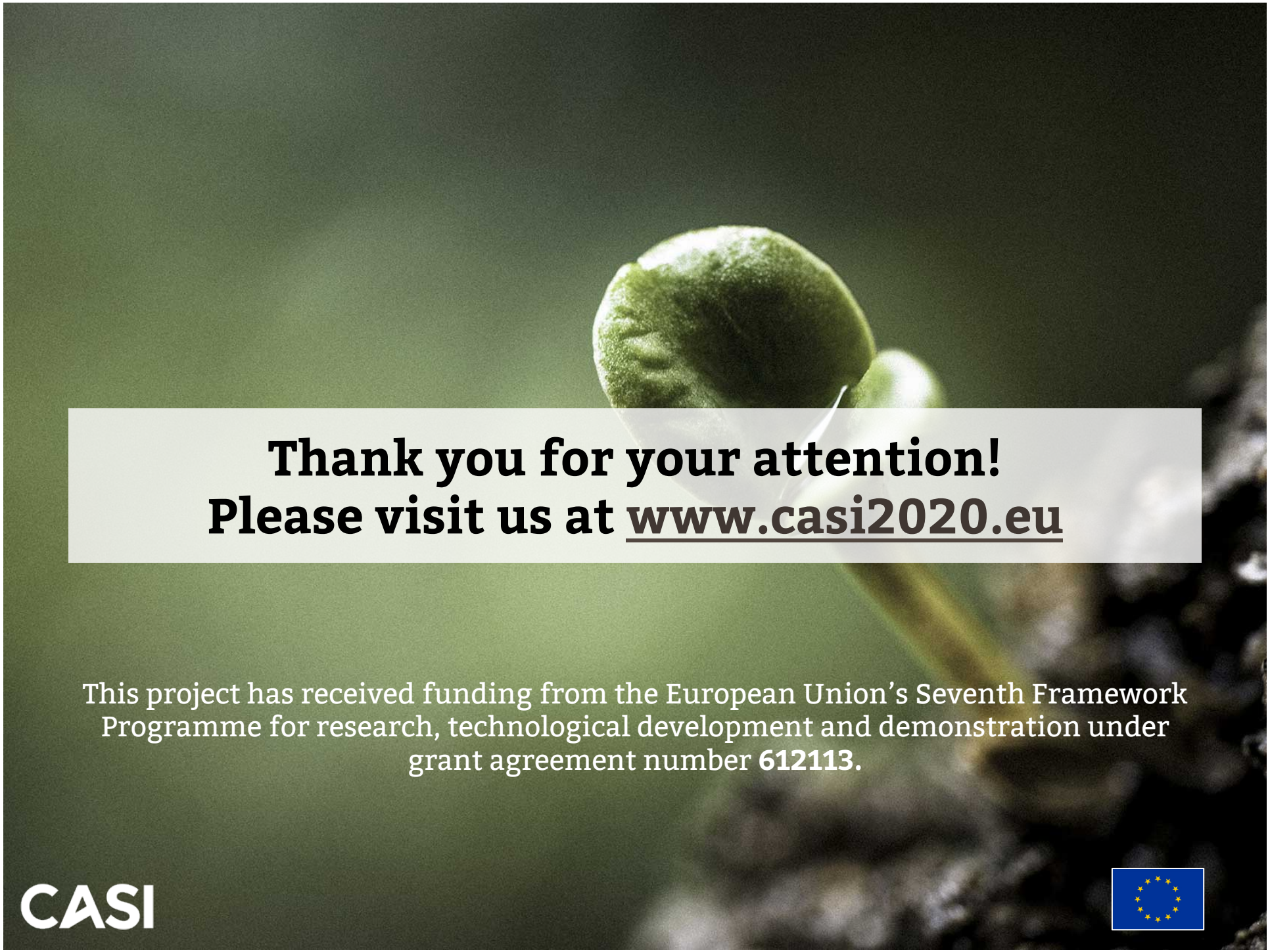
Thank you for your attention!
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