IMPETUS

Turning climate commitments into action

Deliverable Report

Adaptive Exploitation Plans v2

30.09.2024

Deliverable Number: D6.8

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101037084.

Deliverable No.	D6.8
Deliverable nature	Report (R)
Work Package (WP) and Task	WP6, T6.3
Dissemination level	CO
Number of pages	72
Keywords	Exploitation, Results, Joint Plans, Business, Strategy, Impact
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Contractual submission date	30.09.2024
Actual submission date	30.09.2024

[1] PU = Public
CO = Confidential, only for members of the consortium (including the Commission Services)
R = Report
ORDP = Open Research Data Pilot

Technical References

Project acronym	IMPETUS
Project full title	Dynamic Information Management Approach for the Implementation of Climate Resilient Adaptation Packages in European Regions
Call	H2020-LC-GD-2020-2
Grant number	101037084
Project website	http://climate-impetus.eu/
Coordinator	EUT

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101037084.

Document history

V	Date	Beneficiary	Author / Review
V1	23.07.2024	EUT	Maria Zaragoza
V2	30.07.2024	EUT	Laura Armayones
V3	17.09.2024	EUT, THETIS, KWB	Joana Diaz, Elisa Andreoli, Nasrin Haacke
V4	25.09.2024	NTUA	Christos Makropoulous (Quality Manager)
FINAL	30.09.2024	EUT	Josep Pijuan, Hannah Arpke (Final review and submission)

Disclaimer

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Abbreviations

Abbreviation / Acronyms	Description
AEP	Adaptive Exploitation Plan
AI	Artificial Intelligence
CA	Consortium Agreement
CC	Climate Change
CFS	Certificate of Financial Statement
CM	Climate Mitigation
DoA	Description of Action
DS	Demo-site
DSS	Decision Support System
DST	Decision Support Tool
EAB	External Advisory Board
EC	European Commission
EP	Exploitation Plan
ER	Exploitable Results
EUT	EUT
EU	European Union
FP	Framework Programme
GA	Grant Agreement
GCA	Global Center on Adaptation
HD	Human Dimension
IP	Intellectual Property
IPR	Intellectual Property Rights
KER	Key Exploitable Result
KPIs	Key Performance Indicators
LOB	Lobelia
MuSP	Multi-Sided Platform
NBS	Nature-Based Solutions
PB	Project Board
PC	Project Consortium
PMT	Project Management Team
PSB	Project Steering Board
QH	Quintuple Helix
RKBs	Resilience Knowledge Boosters
RTO	Research and Technology Center
R&D	Research and Development
SAR	Synthetic-Aperture Radar
SDGs	Sustainable Development Goals
SH	Stakeholders
SHE	Stakeholder Engagement
SM	Sewer Mining
SME	Small and Medium Enterprise
SW	Software
SWOT	Strengths, Weaknesses, Opportunities and Threats
TRL	Technological Readiness level
UI	User Interface
UN	United Nations
UX	User Experience
VR	Virtual Reality
WIPO	World Intellectual Property Organization
WP	Work Package
WPL	Work Package Leader

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Executive Summary

This second Adaptive Exploitation Plan document contains the main outcomes generated and collected from T6.3 Adaptive Exploitation Plans, task led by Eurecat.

It includes the methodological approach that structures the work being developed in the *WP6 Boosting project impact* of the IMPETUS Project. Then, it explains the specifications of the three exploitation pillars that constitute the task T6.3 *Exploitation of IMPETUS solutions*: the Individual/Joint solutions per partner, the Resilience Knowledge Boosters (RKBs) and the IMPETUS Platform als kno as Multi-sided Platform (MuSP). For the first exploitation pillar, the list of Exploitable Results (ERs) has been updated and analyzed with the aim of having an overview of the situation that the IMPETUS individual/joint solutions have at M36. Apart from this, there is the identification of Key Exploitable Results (KERs) that are developed by the for-profit organizations in the consortium. This identification includes the creation of business-oriented strategic plans that contribute to boost the exploitation impact of results with a high level of potential at this stage of the project. Then, for the two remaining exploitation pillars, there has been new content created during these last months and included in this report. This content is crucial to go forward with the exploitation tasks of the project and it consists of the conceptualization of the RKBs strategy development and the IMPETUS Platform.

The next deliverable will conclude the finalization of the exploitation pillars that are expected from the IMPETUS project. This final deliverable at M48 will have as main objective to ensure the proper exploitation of results considering the diversity of them and achieving the creation of societal, scientific and technical impact.

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1 Introduction

To guarantee the continuity of the IMPETUS results in the long-term and generate significant impacts on each region, it is crucial to provide guidelines on how to carry out the exploitation of such solutions. In IMPETUS, currently, 64 exploitable results (climate adaptation solutions) have been acknowledged, including the IMPETUS Multi-Sided Platform (MuSP) and the Resilience Knowledge Boosters (RKBs). Moreover, as a consequence of the diversity of IMPETUS partners regarding the type of organization and geographical area, it demands personalized strategies for the exploitation of individual and joint solutions. Because of this, D6.8 Adaptive Exploitation Plans v2 is crucial to collecting the different results, interests, strategies, and plans.

As mentioned in the other WP6 deliverables, according to extensive research and the results obtained from the workshops performed for T6.1 and T6.2 (see Deliverables D6.4 and D6.6 for further information), adaptation is an important matter given the current climate change situation. On this line, the exploitation of the set of adaptation solutions presented in the IMPETUS project is vital to make a difference. Such exploitation will enable each DS to adjust to their new conditions and to mitigate potential future effects, making them more resilient and responsive to climate change.

Deliverable D6.6 already points out that few corporations are currently adopting business models with the aim of addressing climate adaptation. On the same note, although their increase in focus on climate adaptation, public agents are still in need of accelerating their initiatives to build more resilience. According to the UN's Adaptation Gap Report of 2023[1], 85% of countries have implemented some form of adaptation strategy, whereas half of the remaining 15% are in the process of doing so. However, the report continues by commenting that further planning and exploitation is still necessary.

A current issue mentioned in this same report is that, although there are numerous adaptation projects and actions to be implemented, many of them are not adequately detailed and there is a lack of information on the outcomes and results of such implementations. Therefore, this shows that the implementation of many projects is not done as thoroughly, and it is difficult to determine the effectiveness of the actions and strategies that are currently being exploited.

For these reasons, the **Adaptive Exploitation Plans** (AEP) provided in D6.8 are essential to lay out the information on how to implement the IMPETUS solutions for both public and private agents. Adaptative Exploitation Plans refer to the exploitation plans and strategies tackling climate adaptation solutions. Throughout the execution of them, the progression of this project in the long-term is assured with the objective of achieving more climate resilience. When the term exploitation is mentioned across this document, the definition is the one spread by the European Commission. Exploitation is defined as "the use of results in developing, creating and marketing or improving a product or process, or in creating and providing a service in standardization activities or shaping a policy[2]".

1.1 Objectives of task and deliverable

As stated in the first deliverable of T6.3, the objective of WP6 is to **foster long-term project impacts** according to the Description of Action (DoA), making sure that the Resilience Knowledge Boosters (RKBs) offer opportunities for private and public investments in the climate adaptation solutions developed by IMPETUS. In order to do so WP6 will:

- Provide **briefings and guidelines** to decision-makers in public agencies and administration, offering assessments of social benefits and costs connected with climate adaptation solutions, and identifying policies (including market-oriented instruments) suitable for innovative climate change adaptation measures.
- Provide **briefings and guidelines** to decision-makers in industry and finance, signaling business opportunities connected with climate adaptation solutions, identifying financing mechanisms, market potentials and synergies with public policy.

[1] Adaptation Gap Report 2023 | UNEP - UN Environment Programme
[2] https://research-and-innovation.ec.europa.eu/strategy/dissemination-and-exploitation-research-results_en

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- Actively support the **exploitation of innovative initiatives** evolving from the resilience knowledge boosters of IMPETUS.

T6.3 Exploitation of IMPETUS solutions takes place between M6 and M48 and counts with the participation of all the project partners. It aims to establish and maintain an exploitation culture throughout the project through the elaboration of individual and joint exploitation plans addressing the following:

- **Identification of exploitable project outcomes**: Understand and describe the exploitable results generated by partners and coordinate their management.
- **Joint exploitation plans**: Provide guidance on the elaboration of exploitation plans, such as the strategy for the MuSP, individual plans and also, potential partnerships between different project partners.
- **Development of business-oriented strategic plans and scale-up opportunities for the for-profit exploitation partners**: Support for-profit partners in the elaboration of detailed plans to exploit their outcomes of the project that can represent social, economic, and business benefits.

In parallel to these activities, T6.3 is directly involved in the **conceptualization of the web-based multi-sided platform (MuSP), the RKBs, and its strategy**. T6.3 is working together with T8.4, as this last is covering the design of IPR strategies and mechanisms that can help partners to better understand how they can exploit their results.

The present deliverable D6.8 is structured in the following sections:

- Section 2 Exploitation methodology and strategy: This part includes an explanation of the topics of WP6 that will be covered in this specific deliverable.
- Section 3 Status of Exploitable Results (Individual and Joint solutions): A table composed of all the IMPETUS solutions will be presented in this section, including the relevant information for their exploitation such as the climate hazard being addressed, the key stakeholders and the potential end-users of each solution.
- Section 4 Business-oriented strategic plans: The strategic plans to follow for each Key Exploitable Result are detailed in this section by their corresponding partners.
- Section 5 Conceptualization of the RKBs strategy development: The exploitation strategy for RKBs is explained here. For this matter, this section includes a SWOT analysis for each DS, and a detailed description of the RKBs.
- Section 6 IMPETUS Multi-Sided Platform (MuSP): The methodology and conceptualization of the development of the IMPETUS platform are included in this section.
- Section 7 Next steps and conclusions: Lastly, D6.8 contains the conclusions reached regarding the exploitation of the project's solutions, as well as the specification of the next steps to implement in the upcoming future.

2 Exploitation methodology and strategy

In accordance with the overall objective of WP6 in the IMPETUS project, which is directed at achieving a long-term impact of its solutions in the different regions, Figure 1 illustrates the set of deliverables that constitute WP6 as well as its methodology. In WP6 there are two levels of analysis, as represented in the figure; first, an analysis of each DS at the EU and regional level and secondly a study of the climate adaptation solutions developed for each DS.

In this case, T6.3 is aimed at providing Adaptive Exploitation Plans and its methodology is located at the second level of analysis previously introduced. Starting from the list of the IMPETUS climate adaptation solutions for each DS, the exploitation plans addressed for the project partners will be developed and contained in this report. Additionally, in the case of the for-profit partners, business-oriented strategic plans will be created and, finally, D6.8 will include the conceptualization for a multi-

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sided platform (MuSP) and for the Resilience Knowledge Boosters (RKBs). In order to provide adequate exploitation plans, a set of SWOT analyses has also been carried out for all the DS.

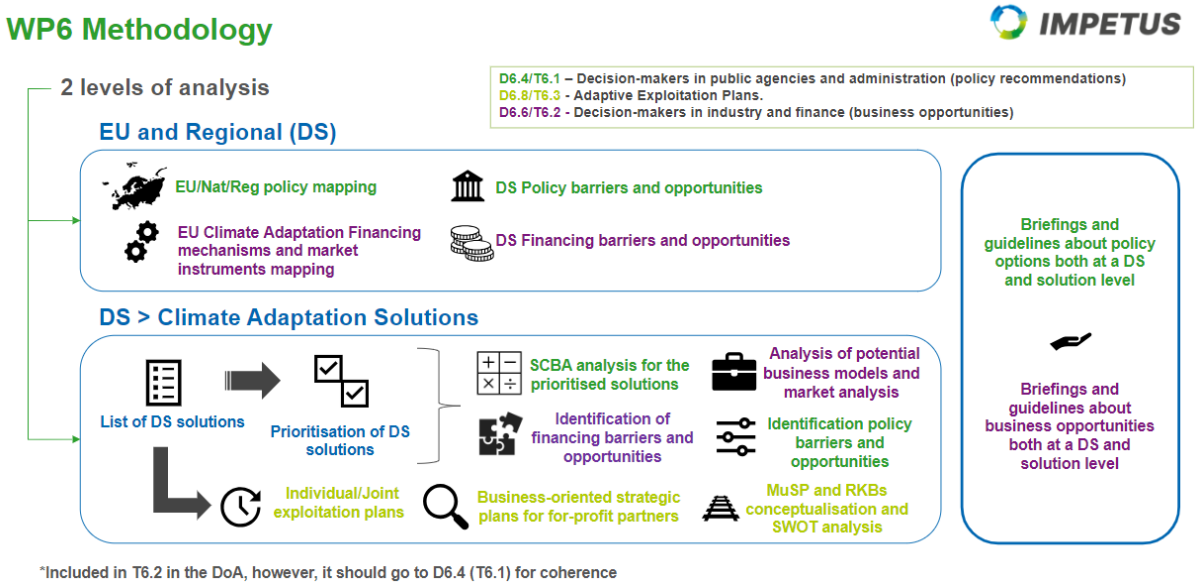

Figure 1. WP6 Methodology

To start with, a key point from D6.3 should be recalled regarding the main definitions that structure T6.3 in general. On the one hand, the term of **exploitation** means, according to the European Commission, the **use of results** of a project to continue developing, improving or creating a new product, service, know-how or process. It can be political, societal, commercial, and aimed at improving public knowledge[3].

On the other hand, remember that the **Adaptive Exploitation Plans (AEP)** are built to maximize the impact of IMPETUS developments and prepare the outcomes' transition towards market uptake to ensure replicability and knowledge creation. The AEP describes the activities undertaken (how and by whom) to ensure the exploitation beyond the project itself.

The previous definitions and the information stated in the first deliverable of this task, D6.3, have been the starting point of all the subtasks that encompasses the Exploitation methodology and strategy in the IMPETUS project. However, in the past months the methodology and structure of T6.3 have been further constructed and materialized, as is displayed in the following Figure:

[3] https://research-and-innovation.ec.europa.eu/strategy/dissemination-and-exploitation-research-results_en#:~:text=The%20use%20of%20results%20in,improving%20public%20knowledge%20and%20action.

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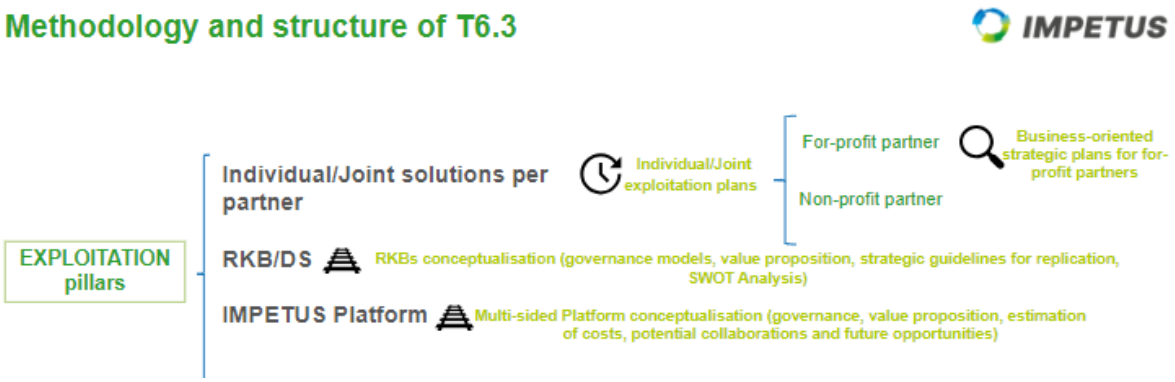

Figure 2. T6.3 Methodology

As can be observed, three Exploitation pillars can be distinguished and they are the individual or joint solutions developed per partner, the RKBs, and lastly, the IMPETUS Platform.

- For the **Individual or Joint solutions per partner**, exploitable results are identified, and **exploitation plans** are designed to guide each involved partner in elaborating an exploitation plan for the number of solutions they are developing within the IMPETUS project. The identification of these results is made possible through the distribution of a shared and live table by the Exploitation team, as was already commented in D6.3. This table has been named internally as **Product list,** as it includes all the solutions being developed. A conceptual remark should be made here, as the naming of such a table can lead to some misunderstanding. The Exploitation team considered referring to the table as Product list in order to help project partners identify it easily. However, this does not mean that every result included in the list will be exploited as a product, because this would go against the diversity that results can have according to the EC's exploitation definition previously mentioned. Besides the identification of results, another important task at this point of the project is the design of exploitation plans. These exploitation plan templates, completed by partners and validated by the EUT team, have been adapted to whether partners were for-profit or non-profit, due to their nature and diverse interests. That is why only the for-profit partners have completed business-oriented strategic plans of the results developed in IMPETUS that are foreseen to have an uptake to the market.
-
- For the **RKBs** being developed at the Demo-site level led by WP2, some exploitation guidelines are also relevant. That is why a SWOT analysis has been done in order to have an overview of the business strengths, weaknesses, threats and opportunities. This exercise has been useful for partners to acknowledge internal but also external dynamics to consider for the success of the RKBs. Thanks to this activity, the Exploitation team is working on the RKBs conceptualization that includes the value proposition of each RKB as well as their governance models and strategic guidelines for replication.

- Lastly, for the **IMPETUS Platform**, a conceptualization of this multi-sided platform has been elaborated. The design process has been participative, as it has iteratively involved all the partners to provide their opinions on the progress made. For the exploitation matters, an exploitation strategy is being formulated to have practical guidelines on how to maintain this platform in the long-term. The definitive version will be included in D6.9.

Having said that, it is important to mention that this deliverable is presented at an intermediate point for the exploitation tasks to be performed in the IMPETUS project. The definitive version of the adaptive exploitation plans changes will be included in D6.9.

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3 Status of Exploitable Results (ERs): individual and joint solutions

In line with the Exploitation Methodology and Strategy section, this section has its origin from the collection of information directly from the tasks carried out by partners. The final version will be released at the end of the project (D6.9), but in the present document the updated version of M36 is included and analyzed.

The definition of the items that constitute this Product List has been tailored according to the exploitation needs that the EUT team has identified, to create the required business pathways for both individual and joint results in the IMPETUS project. It is important to gather and organize information with a certain level of standardization to have a comprehensive analysis of the different exploitation potentials that can take place. Also, for the well-functioning of the IMPETUS Platform, some pre-defined items should be defined and classified as further explained in section 6 of this document. Regarding the standardization of items for exploitation, these are the items that can be found in the Product list together with their definitions:

Main items for the descriptive part of the result		
Item	**Definition and Description of Item**	**Possible suggested options**
Area	Areas defined to have a general classification of the results in the IMPETUS project.	- Nature-based solutions - Innovative Technologies - Governance, Awareness and Behavioral Change - Financing and Insurance
Climate Risk	Climate risk hazards addressed by the project are based on the IMPETUS climate risks' list.	- Sea level rise - Flooding risk - Water scarcity - Marine storms - Fires - Biodiversity loss - Health diseases - Temperature increase - Avalanche increase - Extreme storms - All
Adaptation Sectors	Sectors in which the resulted solution can contribute to mitigate the climate impact and increase the level of adaptation. The suggested list is also based on the REGILIENCE project classification, which in turn took the Climate ADAPT[4] classification as reference.	- Agriculture - Biodiversity - Buildings - Business and Industry - Coastal areas - Cultural Heritage - Disaster Risk Reduction - Energy - Financial - Forestry - Health - ICT - Land and Use Planning

[4] Discover the key services, thematic features and tools of Climate-ADAPT (europa.eu)

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		- Marine and Fisheries - Mountain areas - Tourism - Transport - Urban - Water Management - NONSPECIFIC
Category of the result	Categorization of the diverse results into standardized categories given the nature of each result. This is further developed with definitions per each category in order to help partners to identify the category or if their result corresponds to a combination of more than one category.	- Tool - Software - Methodology - Procedure - Dissemination materials - Training - Databases - Technology demonstrator - Know-how
Name of the Exploitable Result	Name of the result in question.	N/A
Technology Readiness Level	Initial and final TRL of the result in question. Notice that there are some results that do not involve a technological development (N/A).	From TRL 1-9
Geographical ubication	Demo-site, Country and Region in which the result has been developed.	The established Demo-sites in the project
Contribution to SDGs	Name of the Sustainable Development Goals in which the particular result has a meaningful contribution.	N/A
Value proposition	Short explanation on the ADDED VALUE of the particular result, of its objective in general.	N/A
Contact person	Name of the person that is responsible for the particular result.	N/A
Possible Ownership	Name of the organization that is owning the development of the particular result.	N/A
Type of partner	Type of the organization that is owning the development of such result. This differentiation helps to identify the results owned by profit vs. non-profit partners within the consortium.	- Private Company - RTO - Innovation and/or Research Center - University - Public administration, governmental body

Table 1. Main items for the results considered in the IMPETUS Product list

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As stated in the explanation of the *Category of the result* item, the Exploitation team provided the following legend to guide partners to identify to which category their result belongs to:

Item	Definition
Tool	Electronic, digital or physical resource that supports to do something (e.g., decision support tool, heat map, digital twin, etc.).
Software	Programs and other operating information used by a computer.
Methodology	Methodology refers to a system of methods employed in a particular area of study or activity. It is more STRATEGIC (e.g., strategic plan to be followed, management strategy, framework). When the methodology is recommended to Stakeholders, it is a METHODOLOGY/GUIDELINE.
Procedure	Procedures refer to activities performed during data collection and analysis phases of research studies. It is more OPERATIONAL (e.g., laboratory procedures, procedures in rice fields, etc.).
Training	Transfer of knowledge and guidelines with a transfer purpose (e.g., MOOC course, PhD programs, etc.).
Databases	A database is an organized collection of data, so that it can be easily accessed and managed.
Technology demonstrator	Prototype, rough example or otherwise incomplete version of a conceivable product or future system.
Know-how	Practical knowledge or skill; expertise on a determined field.

Table 2 Definitions for the Category result's item

Then, some items have been aggregated in the last past months to have more relevant information for exploitation matters. This is aimed to have a more comprehensive and complete picture of each result and thus, make better decisions on the exploitability potential of the Exploitable Results. The final list of the Key Exploitable Results (KERs) of the project will be defined in the next months and it will be delivered in the final report D6.9 (Adaptative exploitation plans v3) at M48.

Further information for the Exploitation Task (T6.3)		
Item	**Definition and Description of Item**	**Possible suggested options**
Type of Exploitation	Exploitation route that the partner is interested given the nature of their organization combined with the result itself.	- Service provision - Publication - Training - Licensing - Direct sale - Open access - Dissemination - Internal use - Others
Stakeholders	Agents of the ecosystem that may help result's owner to exploit the result.	The list of agents in this item is quite diverse given that the Exploitation team left freedom to partners to represent the reality of their ecosystem. Some agents are: - Policy makers - Consultancy companies - Insurance companies - Citizen participants - Regional authorities - Local stakeholders - Town halls

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		- Governmental agencies
Type of End-users	Typologies of potential end-users that can be interested in the benefits that arise from the acquisition of the result. This has been standardized from a conceptual perspective and combinations of different typologies can be possible too.	- Citizens - Investors / Businesses - Technology providers - Policy makers - Scientific Experts / Academia - All
Examples of End-users in your region	In line with the above items, partners are asked here to provide tangible examples of end-users present in the region that are already engaged or can potentially be engaged.	N/A
Potential geographical replicability	This is to make partners think about the level of replicability that the result has in other geographical ubications.	N/A

Table 3. Further information for the items of the IMPETUS Product list

Also, in the Product list there are the following items that correspond to the IPR management also led by EUT. It is included here given the interrelations that IPR has with the exploitation routes that partners are interested in. This interrelationship is already included in D6.3 and in practice it is being executed with a high level of cooperation and communication between the Exploitation team and the IPR Manager. All the specific details of IPR management will be included in the deliverable D8.9.

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3.1 M36 – Updated IMPETUS Exploitable results

The exploitable results have been collected by the EUT team in the last months (from M.18 to M36) and the current version of them is displayed in Table 1. This table has been named internally as "IMPETUS Product list" and it is a living document that can be found in the SharePoint of the project. The naming was chosen in order to help partners to identify easily such list, but it is important to mention, as already explained in Section 2, that not all the results arising from tasks are products per definition. This does not mean that some exploitable results cannot be products, but this classification depends on the Exploitation managers. Besides this, the Exploitation team is in charge of standardizing and validating the inputs from partners when they are asked to provide information regarding their results. They also guide partners on how to complete the various sections related to the outcomes of each project task.

#	Exploitable result	Area	Category of result	Climate Risk	Adaptation Sectors	TRL	Demo-Site	Owner	Type of exploitation	Stakeholders' identification	Targeted End-Users
1	Artificial Intelligence (AI) model to analyze anthropogenic factors	Innovative Technologies	Procedure	All	NONSPECIFIC	6-7	5. Arctic DS	UIT	Service provision; Publication	Policy makers; consultancy companies; insurance companies	Investors / Businesses; Policy makers
2	Citizen participation guidelines for CA	Governance, Awareness and behavioral Change	Methodology / Guidelines	All	Social acceptance; Urban; Water management	N/A	5. Arctic DS	UIT	Training; Publication	Citizen participants	Investors / Businesses; Policy makers
3	Climate Adaptation Tools (Strategic Adaptation Pathways Identification Tool, linked with the submodules Risk and emerging problems inference engine)	Innovative Technologies	Tool	All	NONSPECIFIC	4-6	8. All DS	NTUA	Service provision	Regional authorities; Planners; Local stakeholders; Academia	Policy makers
4	Climate and key community open linked data	Innovative Technologies	Databases	All	NONSPECIFIC	6-7	9. Worldwide	EUT	Publication	Policy makers; consultancy companies; insurance companies	Investors / Businesses; Policy makers
5	Climate events identification using pattern recognition	Innovative Technologies	Procedure	All	NONSPECIFIC	6-7	9. Worldwide	EUT	Service provision; Publication	Policy makers; consultancy companies; insurance companies	Investors / Businesses; Policy makers

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6	Co-creation of CEA (Controlled Environmental Agriculture) solutions	Governance, Awareness and behavioral Change	Procedure	Water Scarcity	Water Management; Health; Energy	N/A	3. Mediterranean DS	MAICH; (Attica Green)	Service provision	Ministry of Environment; Local and regional authorities of Attica; Central government; Water companies; Researchers; Municipality of Water Directorate of Decentralized Administration of Attica; Farmers (group or individual); Local society	Citizens; Investors / Businesses
7	Context Broker-based open data space	Innovative Technologies	Software	All	NONSPECIFIC	8-9	8. All DS	EUT	Service provision	Developers; Researchers; RTOs	All
8	Custom Climate Indices projection tool	Innovative Technologies	Procedure	All	NONSPECIFIC	6-7	5. Arctic DS	UIT	Service provision; Publication	Policy makers; consultancy companies; insurance companies	Investors / Businesses; Policy makers
9	Data preprocessing module	Innovative Technologies	Tool	All	NONSPECIFIC	1-6	8. All DS	EUT	Service provision	Scientist; developers	Technology providers; Scientific experts / Academia
10	Database of WTP estimates for Ecosystem Services	Innovative Technologies	Databases	All	NONSPECIFIC	6-TBD	9. Worldwide	AUEB	TBD	Policy makers; Local and regional authorities; Private users and organizations (industry); Public-Private Partnerships; Researchers	Investors / Businesses; Policy makers; Scientific experts / Academia
11	Decentralized fit-for-use reclamation system	Innovative Technologies	Procedure / Tool	Water Scarcity	Water management; Urban	5-7	2. Coastal DS	EUT	Service provision	Private users; Regional authorities; Town halls; Water management organizations; Society	Citizens; Investors / Businesses
12	Decision Support System for integrated water management based on a Digital Twin	Innovative Technologies	Tool	Water scarcity	Water management	4-6	7. Mountain DS	EURAC; MGIS	Service provision	Private users (farmers); Decision-makers (public authorities); Hydropower companies; Water utilities; Irrigation consortia	Investors / Businesses; Policy makers
13	Decision Support Tool for industrial decarbonization	Innovative Technologies	Tool	All	Energy	6-TBD	4. Atlantic DS	WEI	Service provision	Industrial companies; Harbors; Clusters	Investors / Businesses
14	Decision Theatre methodology for integrated water	Governance, Awareness and	Methodology	Water scarcity	Water management; Urban; Health	N/A	1.Continental DS	GCF	Licensing	Regional stakeholders	Policy makers

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	resource management	behavioral Change									
15	Design criteria and methodology for Regional Adaptation Pathways	Governance, Awareness and behavioral Change	Methodology	All	NONSPECIFIC	N/A	8. All DS	Thetis	Publication; Dissemination	Policy makers at regional and local level; Technical experts (for selecting technical parameters like tipping points); NGOs and researchers; Economic actors affected by climate change and by the adaptation process	Policy makers: Scientific experts / Academia
16	Digital Twin for marine management	Innovative Technologies	Tool	All	Biodiversity; Marine and Fisheries; Health; Coastal areas	5-7	5. Arctic DS	UIT; TFFK; N&S	Service provision	Regional and local authorities; Companies in aquaculture sector; Fisheries	Policy makers
17	Digital Twin to predict sea level rise	Innovative Technologies	Tool	Sea level rise; Flooding risk	Urban; Water management; Coastal management	5-7	5. Arctic DS	UIT; TFFK	Service provision	Governmental institution (NVE); (Geodata AS)	Policy makers
18	DS visualization framework	Governance, Awareness and behavioral Change	Tool	All	Water management; Hospitality; Weather management	6-7	8. All DS	Mantis; EUT	Service provision	Policy makers; Consultancy companies; Insurance companies	All
19	Dune restoration potential indicator	Nature-based Solutions	Methodology	Extreme storms; Sea level rise; Water scarcity	Coastal areas; Disaster risk reduction	N/A	2. Coastal DS	UDG	Publication	Private users; Regional authorities; Society	Policy makers; Scientific experts / Academia
20	Dynamic contingency response Tool	Innovative Technologies	Tool	All	NONSPECIFIC	4-6	8. All DS	NTUA; MAICH	Service provision	Regional authorities; Academia; Research	Policy makers
21	Early warning system for flooding prediction	Innovative Technologies	Software	Flooding risk	Civil protection; Disaster risk reduction	6-8	6. Boreal DS	ZPR; JDC	Service provision	Municipalities of Zemgale region; Local inhabitants of Zemgale region	Policy makers
22	Effectiveness of sand fences in dune restoration	Nature-based Solutions	Procedure	Extreme storms	Coastal areas; Disaster risk reduction	8-9	2. Coastal DS	UDG	Publication	Private users; Regional authorities; Society	Policy makers; Scientific experts / Academia
23	Evaluation of altitudinal shifts of crops	Governance, Awareness and behavioral Change	Methodology	Water scarcity; Temperature increase	Agriculture; Biodiversity; Water management	N/A	7. Mountain DS	FEM	TBD	TBD	TBD

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24	Flood risk decision support tool and 3D visualization	Innovative Technologies	Software	Flooding risk; Extreme storms; Sea level rise	Water management; Disaster risk reduction	1-8	4. Atlantic DS	N&S	Licensing	IMPETUS partners; N&S flooding experts; IT department; Municipality of Rotterdam; Province of Zuid-Holland	Policy makers
25	Framework and metrics for climate change vulnerability, resilience and adaptation	Governance, Awareness and behavioral Change	Tool / Methodology	All	NONSPECIFIC	N/A	8. All DS	KWR	Publication	Regional institutions; Municipalities; Water authorities; NGOs; Researchers	Policy makers; Scientific experts / Academia
26	Framework for adaptive governance based on scientific articles	Governance, Awareness and behavioral Change	Policy methodology	All	Urban; Water management; Coastal management; Institutional organization	N/A	5. Arctic DS	UIT	Publication	Governmental agencies; Tromsø municipality	Policy makers; Scientific experts / Academia
27	Guidelines for integrating local intangible cultural heritage into adaptation strategies	Governance, Awareness and behavioral Change	Know-how	All	NONSPECIFIC	2-3	7. Mountain DS	EURAC	Publication; Dissemination	Farmers; Wine-making producers; Agricultural entrepreneurs; Grassroots associations; Local institutions	Citizens; Investors / Businesses
28	Guidelines to apply Nature-Based Solutions (NBS) to restore dunes	Nature-Based Solutions	Methodology / Guidelines	Extreme storms	Coastal areas; Disaster risk reduction	N/A	2. Coastal DS	UDG	Publication; Training	Private users; Regional authorities; Society	Policy makers
29	Guidelines to improve the renovation of built heritage taking into account adaptation measures	Governance, Awareness and behavioral Change	Methodology / Guidelines	All	NONSPECIFIC	N/A	7. Mountain DS	EURAC	Publication; Dissemination; Internal use	Local and provincial authorities	Policy makers
30	Guidelines to optimize insurance schemas for agriculture in the context of climate change	Financing and insurance	Methodology / Guidelines	All	Agriculture	N/A	7. Mountain DS	EURAC; MGIS	Publication; Dissemination; Internal use	Insurance companies	Investors / businesses
31	Handbook to adopt early warning systems for flooding prediction	Governance, Awareness and behavioral Change	Methodology / Guidelines	Flooding risk	Civil protection	N/A	6. Boreal DS	JDC; (POIC)	Publication	Municipalities of Zemgale region; ZPR; JDC	Policy makers

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32	Heat stress decision support tool	Innovative Technologies	Tool	Temperature increase	Health; Disaster risk reduction; Urban; Buildings	8-9	4. Atlantic DS	N&S	Service provision	IMPETUS team; N&S heat stress team; IT department; Schouwen-Duiveland partners	Policy makers
33	Impact Chains (IC) guidelines for risk assessment, including assessment of risk management capacities	Governance, Awareness and behavioral Change	Methodology / Guidelines	All	Disaster risk reduction	N/A	7. Mountain DS	EURAC	Service provision; Publication	Decision-makers (i.e. local and provincial authorities such as mayors); First responders; Consultancy companies	Policy makers
34	Improvement of Artificial Intelligence (AI) downscaling algorithm at point level	Innovative Technologies	Methodology	All	NONSPECIFIC	5-6	8. All DS	LOB	Service provision; Internal use; Publication	Researchers	Citizens; Investors / Businesses; Policy makers
35	Innovation Packages for adaptation and resilience	Governance, Awareness and behavioral Change	Methodology	All	NONSPECIFIC	N/A	8. All DS	Thetis	Publication; Dissemination	Policy makers; Technical experts; NGOs and researchers; Economic actors	Investors / Businesses; Policy makers; Scientific experts / Academia
36	Integrated mapping and modelling of regional water resources (surface water and groundwater)	Innovative Technologies	Procedure	Water scarcity	Water management; Urban; Health	6-8	1.Continental DS	RTO	Service provision	Regional authority (Berlin Senate); Academia and research	Policy makers
37	Interactive mapstories for climate change communication	Governance, Awareness and behavioral Change	Methodology	All	Biodiversity	N/A	2. Coastal DS	IUC; UDG	Dissemination	Regional and national authorities; Environmental NGOs; IMPETUS partners in DSs	Technology providers; Policy makers; Scientific experts / Academia
38	Know-how on climate impacts on slush flow, snow avalanche and landslide activity	Innovative Technologies	Know-how	Avalanche increase; Temperature increase; Flooding risk	Disaster risk reduction; Land use planning; Mountain areas; Water management	4-6	5. Arctic DS	UIT	Service provision	Local and national authorities; Interested public; Scientific community	Policy makers; Scientific experts / Academia

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39	Massive Online Open Course (MOOC) on transformative approaches to climate adaptation	Governance, Awareness and behavioral Change	Methodology	All	NONSPECIFIC	N/A	8. All DS	UNSDSN	Training	Professionals and students	All
40	Meta-Analysis and temporal discounting Tool linked to macro-economic Databases	Governance, Awareness and behavioral Change	Tool	All	NONSPECIFIC	4-6	8. All DS	AUEB	Publication	Regional authorities; Academia; Research	Policy makers; Scientific experts / Academia
41	Meteorological data retrieval tool	Innovative Technologies	Tool	All	NONSPECIFIC	6-8	8. All DS	EUT	Service provision	Scientists; Developers	Policy makers; Scientific experts / Academia
42	Methodology to co-create climate services for tourism	Governance, Awareness and behavioral Change	Methodology	All	Coastal areas; Tourism; Disaster risk reduction	N/A	2. Coastal DS	EUT; URV; UDG; DACC	Publication	Planning authorities at regional level; Environmental NGOs; IMPETUS partners in DS; Experts of taxonomic groups (climatologists, sociologists, tourism researchers, geographers, environmental researchers, urban planners)	All
43	Multi-level governance assessment framework	Governance, Awareness and behavioral Change	Methodology	All	NONSPECIFIC	N/A	8. All DS	KWR	Publication	Any organization interested in understanding governance challenges and opportunities to implement climate adaptation solutions.	All
44	Participatory planning guidelines to create pathways for climate adaptation	Governance, Awareness and behavioral Change	Methodology / Guidelines	All	NONSPECIFIC	N/A	6. Boreal DS	BEF	Publication	Policy makers; Regional authorities; Local municipalities; Businesses; NGOs; Research	Citizens; Policy makers
45	Real time online representation of pilot projects visualization of tools and models enabling climate change adaptation in Attica	Innovative Technologies	Platform	Water Scarcity	NONSPECIFIC	4-6	3. Mediterranean DS	NTUA	Service provision	Ministry of Environment; Local and regional authorities of Attica; Central government as policy makers; Water companies; Researchers; Water Directorate of Decentralized Administration of	Investors / Businesses; Policy makers; Scientific experts / Academia

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										Attica; Universities; Public stakeholders and institutions	
46	Regional adaptation pathways	Governance, Awareness and behavioral Change	Methodology	All	NONSPECIFIC	N/A	8. All DS	Thetis	Publication; Dissemination	Policy makers at local and regional level (regional and local public authorities that can adopt the adaptation pathways); Technical experts (for selecting technical parameters like tipping points); NGOs and researchers; Economic actors affected by climate change and by the adaptation process	Policy makers; Scientific experts / Academia
47	Regional climate hot-spot identification Service (HIPS)	Innovative Technologies	Tool	All	NONSPECIFIC	4-6	8. All DS	NTUA	Service provision	Regional authorities; Planners; Local stakeholders; Research academia	Policy makers; Scientific experts / Academia
48	Regional climate resilience footprint Tool	Innovative Technologies	Tool	All	NONSPECIFIC	4-6	8. All DS	NTUA	Service provision	Regional authorities; Planners; Local stakeholders; Research academia	Policy makers
49	Resilience Knowledge Boosters (RKBs)	Innovative Technologies	Databases	All	NONSPECIFIC	6-7	9. Worldwide	EUT	Service provision	Policy makers; Consultancy companies; Insurance companies	All
50	Retrieval Augmented Generation (RAG) based assistant trained on all the work developed in IMPETUS and sister projects	Innovative Technologies	Tool	All	NONSPECIFIC	7-8	8. All DS	EUT	Service provision; Publication	Policy makers; Citizens; Consultancy companies; Insurance companies	All
51	Rice paddies as multifunctional wetlands	Nature-Based Solutions	Procedure	Water scarcity; Sea level rise	Water management; Health; Biodiversity	2-6	2. Coastal DS	EUT	Publication	Rice producers; Irrigation associations; Landowners	Investors / Businesses; Policy makers; Scientific experts / Academia
52	Risk and emerging problems inference engine	Innovative Technologies	Tool	All	NONSPECIFIC	4-6	8. All DS	NUTA; MAICH	Service provision	Regional authorities; Academia; Research	Policy makers

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53	Satellite-based biodiversity monitor and assessment	Innovative Technologies	Tool	All	Biodiversity	4-6	3. Mediterranean DS	MAICH; EUT	Service provision	Regional authorities; Local stakeholders	Policy makers
54	Satellite-based coastal erosion assessment	Innovative Technologies	Methodology	Sea level rise; Extreme storms	Coastal management; Disaster risk reduction	8-9	2. Coastal DS	LOB	Service provision	Regional and local authorities; Private users; Ministry of environment; Coastal management organizations	Investors / Businesses; Technology providers; Policy makers
55	Seasonal forecasts downscaling and climate projection downscaling	Innovative Technologies	Databases	Water scarcity	Water management	5-6	7. Mountain DS	MGIS; LOB TBD	Service provision; Licensing	Hydropower companies; Water utilities; Research institutes	Investors / Businesses; Policy makers
56	Sediment delivery to coastal areas through irrigation networks	Nature-Based Solutions	Methodology	Sea level rise	Coastal areas; Biodiversity; Agriculture	5-7	2. Coastal DS	EUT	Publication	Private users; Regional and local authorities; Resilience research centers	Investors / Businesses; Policy makers; Scientific experts / Academia
57	Sewer Mining (SM) technology	Innovative Technologies	Technology demonstrator	Water scarcity	Water management; Urban	8-9	3. Mediterranean DS	EYDAP; NTUA	Service provision; Publication	Ministry of environment; Local and regional authorities of Attica; Central government as policy makers; Water companies; Researchers; Municipality of Water Directorate of decentralized administration of Attica	All
58	Stakeholders engagement strategies for discussion and co-creation of solution to complex sustainability problems such as climate change	Governance, Awareness and behavioral Change	Methodology	All	NONSPECIFIC	N/A	8. All DS	KWR	Publication; Training	Any organization public or private interested in initiating a bottom-up stakeholder engagement process for co-creation of solution to complex sustainability problems.	All
59	Tools and Methodology to improve drinking water system resilience	Innovative Technologies	Tool / Methodology	Water scarcity; Temperature increase	Water management; Health	4-6	2. Coastal DS	EUT	Service provision	Water management organizations; Environmental research centers	Policy makers

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60	Virtual Reality (VR) visualization to create climate change risk awareness in citizens	Innovative Technologies	Technology demonstrator / Tool	Sea level rise; Flooding risk	Urban; Coastal management; Social acceptance	8-9	5. Arctic DS	UIT	Training; Dissemination	Politicians; Public; Administrators; Interest groups; Consultancy firms	Investors / Businesses; Policy makers
61	Water quality prediction Tool on bathing areas and under severe storms	Innovative Technologies	Tool	Extreme storms	Water management; Coastal areas; Health	6-7	2. Coastal DS	EUT	Service provision; Licensing	Regional and local authorities; Coastal management organizations; Meteorological centers	Citizens; Investors / Businesses; Policy makers
62	Water Reuse Masterplan & Business Plan	Financing and insurance	Methodology	Water scarcity	Water management	4-6	3. Mediterranean DS	NTUA	Service provision	Ministry of Environment; Local and regional authorities of Attica; Central government as policy makers; Water companies; Researchers; Water Directorate of Decentralized Administration of Attica	Investors / Businesses; Policy makers; Scientific experts / Academia
63	Water-Energy simulation and optimization model	Innovative Technologies	Model	Water scarcity	Water management	6-7	3. Mediterranean DS	NTUA	Service provision	Ministry of Environment; Local and regional authorities of Attica; Central government as policy makers; Water companies; Researchers; Water Directorate of Decentralized Administration of Attica	Investors / Businesses; Policy makers; Scientific experts / Academia
64	Zemgale regional Climate Change Adaptation Plan 2023-2030	Governance, Awareness and behavioral Change	Methodology	All	NONSPECIFIC	N/A	6. Boreal DS	ZPR	Publication	Policy makers; Regional authorities; Local municipalities; Businesses; NGOs; Research	Citizens; Policy makers

Table 4. Updated IMPETUS product list (M36)

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3.2 Identification and analysis of Exploitable Results

As is shwon in the previous section, the IMPETUS Product list has been updated with a total of **64** results, based on the first identification of Exploitable Results included in D6.3.

The categorization and the updating activity from partners has led the EUT team to run the following aggregated analysis:

Results per Area
Given the different possible options for the categorization of the solutions by Area, it is observed that the two main ones are, on one hand, Governance, Awareness and Behavioral change (34% of the products are in this area) and, on the other, Innovative technologies (54% belong to this area). This indicates that most of the solutions being implemented at the different demo-sites aim either to raise awareness about the importance of climate adaptation and improve governance, or to implement new technologies to address climate change and adapt to it.

The following graph depicts these results and shows that the total value of Innovative technologies together with Governance, Awareness and Behavioral change exceeds 80%. On the other hand, the other two remaining options, which consist of Nature-based solutions and Financing and insurance, are less relevant, but still jointly account for the 11% of all results.

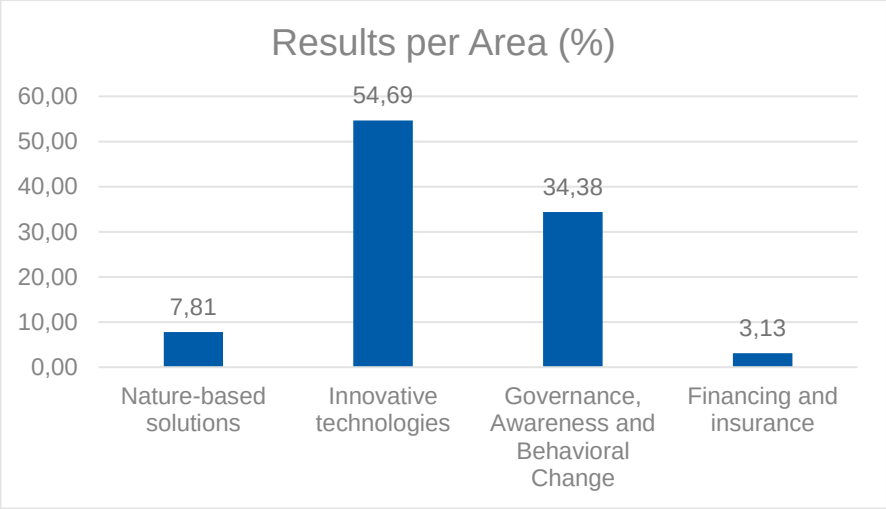

Figure 3. Results per area in %.

Results per Demo-site
This classification determines the region where each ER is implemented, out of a total of seven demo-sites. The following graph depicts the number of solutions for each demo-site in percentages (%). As observed, most of the solutions are applied in all the demo-sites and, following this, there are solutions addressed mainly to the coastal demo-site located in the Catalan coast. On the other hand, the continental demo-site, located in the region of Berlin-Brandenburg in Germany, is the one with the fewest number of climate adaptation solutions. The arctic, mountains and mediterranean demo-sites, situated in Norway, Italy and Greece respectively, follow the coastal demo-site in terms of their weights relative to the total of solutions.

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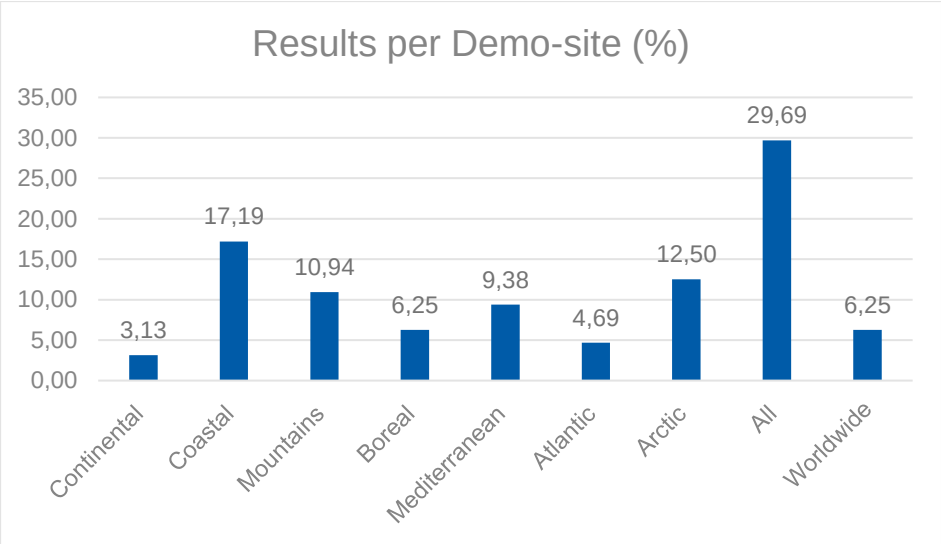

Figure 4. Results per demo-site in %.

Results per Category

As for the category of the results, there are eleven different types with methodologies, tools and procedures being the most prominent. It is also worth noting that, in some cases, more than one category was considered in the table at the same time. The following chart depicts the weights of each type of category and methodology predominates above the others.

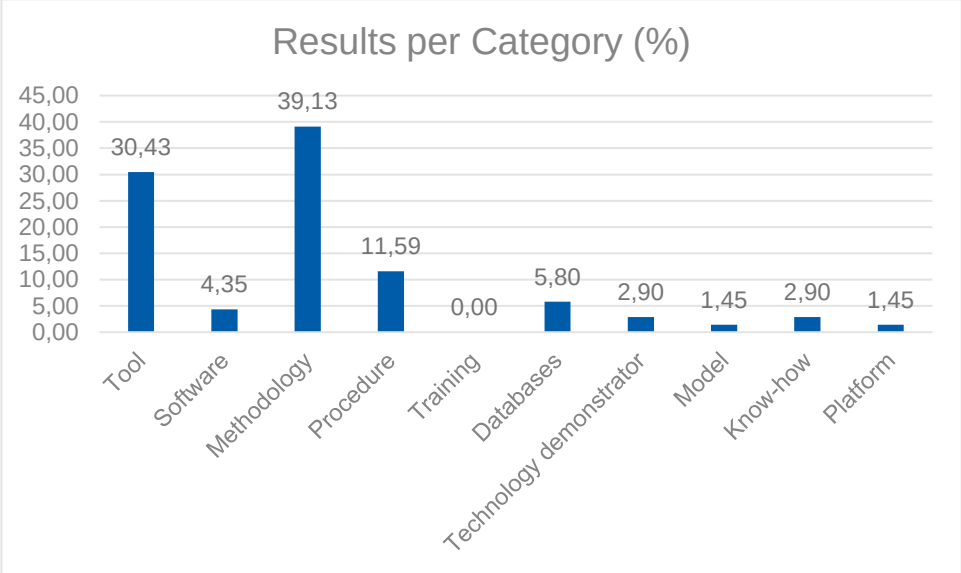

Figure 5. Results per category in %.

Results per technology readiness level (TRL)

The technology readiness level assesses the maturity and overall readiness of a new technology for its final use and ranges in a scale from 1 to 9; 1 being that the technology is at its earliest stages and 9 being that it is at a mature phase. The TRL concept is only applicable to those solutions constituting a specific product or technology that is being developed, and not to methodologies or guidelines.

The above table 4 lists all the climate adaptation solutions along with their TRL. For each ER the table shows two TRL values: one representing the initial level (at the beginning of the IMPETUS project) and the other indicating the current level. It is observed that few of them are at a very early stage, while the majority are between levels 4 and 6 approximately, indicating that they have made progress towards

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maturity, but are still in the development phases. Lastly, some technologies are considered to be between levels 8 and 9 and are therefore almost ready to use. At the current moment, two solutions included only one TRL in the product list, lacking either the initial or the final one. Thus, these have not been included in the following two graphs.

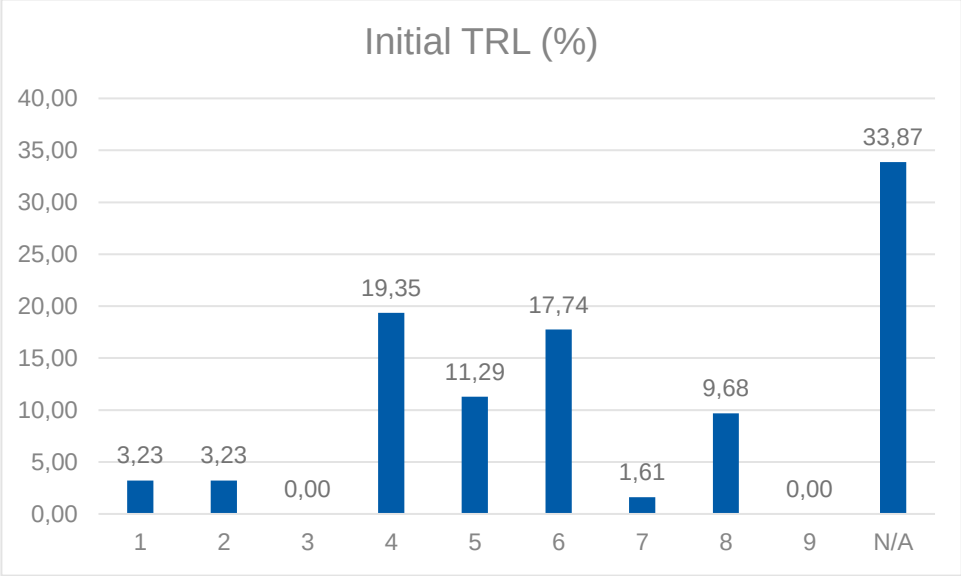

Figure 6. Results per initial TRL in %.

Figure 6 shows the weights of each TRL at the initial phase of the IMPETUS project. On the one hand, it is observed that many of the ER do not correspond to products or technologies with a corresponding TRL (around 33%). On the other hand, it is clear that many of the products started at a medium level between 4 and 6, indicating that further development is still needed but they are not at a very early stage. Then, looking at the extremes, a few solutions were given the lowest or the highest possible initial TRL.

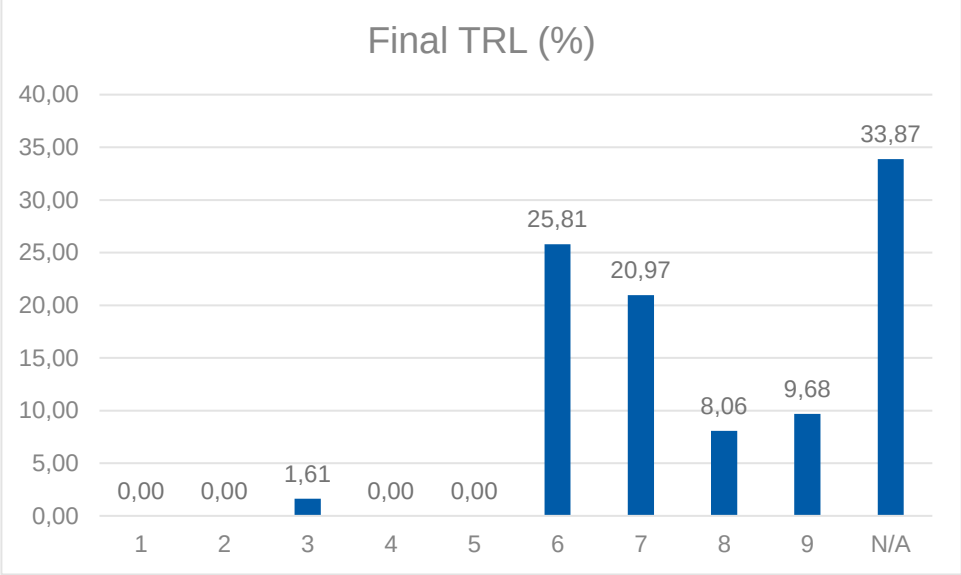

Figure 7. Results per final TRL in %.

Figure 7 depicts the final weights corresponding to the different TRLs at the current moment of the project. Same as for Figure 6, most of the results are not considered products with a specific TRL. Then, on the other hand, the graph indicates that most of the products have advanced to higher levels, leading to final TRLs ranging from 6 and 9 as opposed to the lower initial ones.

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Results per type of exploitation

Table 4 containing all the ER shows that, for most of the cases, the types of exploitation are either service provisions or publications. Dissemination, licensing and training have lower relevance and, additionally, some solutions include more than one type of exploitation. On the contrary, the types of exploitation least represented in the list of solutions are direct sale, which is not considered for any solution, and open access.

The following graph depicts the types of exploitation and the weights for each one, on the basis of the total of solutions displayed in the product list.

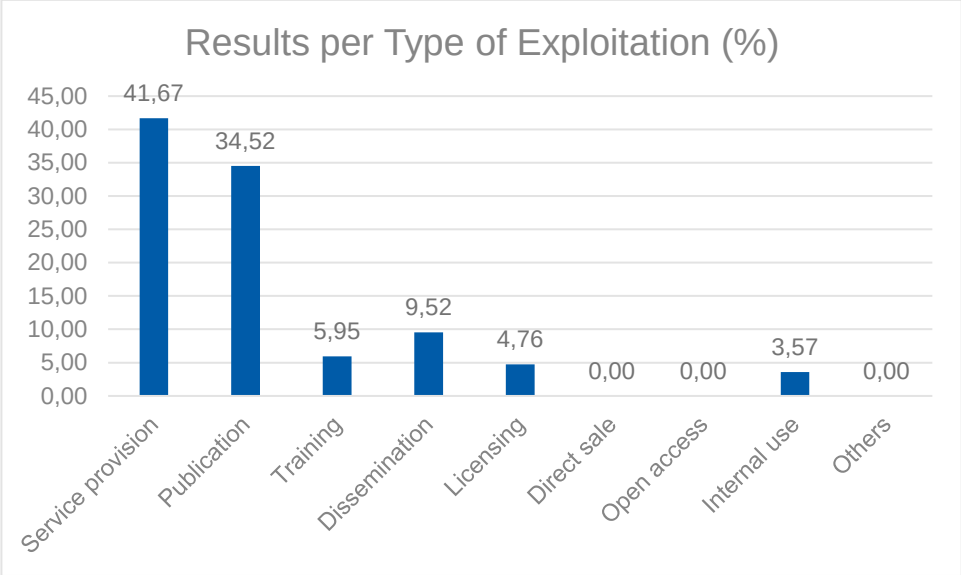

Figure 8. Results per type of exploitation in %.

Results per Targeted End-Users

As for the targeted end-users, the graph below illustrates the different types, and their weights in terms of the ER aimed at each one. Some ER identified several targeted end-users simultaneously, and the results show that the interest is mostly on policy makers and, following this, in investors and businesses. Technology providers, conversely, were the end-users less considered.

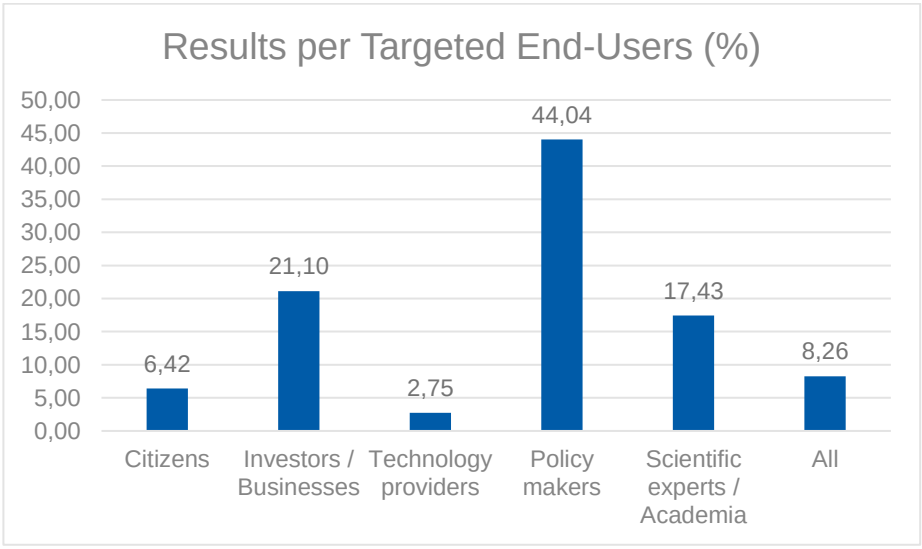

Figure 9. Results per targeted end-users in %.

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4 Business-oriented strategic plans

Following the definition from the Corporate Finance Institute[5], the term strategic planning refers to the process of creating business strategies, as well as implementing them once designed, and evaluating their overall results in terms of their compliance with the organization's long-term objectives.

As for the importance of developing business-oriented strategic plans, Harvard Business School[6] states that the process poses several advantages in terms of allocating resources more efficiently, aligning the interests of shareholders and employees, and prioritizing and bearing in mind the firm's goals.

In the IMPETUS project, the adoption of the ER developed by our partners is essential for achieving meaningful impact. Equally important is the sustainability of companies involved in climate adaptation, as they play a pivotal role in this effort. To support these companies in strategic planning and business development, the following tables—developed in collaboration with our partners—outline market strategies, positioning, and detailed descriptions of the project outcomes.

At the current stage of the project, for-profit partners have developed their results and made important advancements in the exploitation strategy. For this, the Exploitation team oversees collecting information and helping them in the planning phases of the business plan that aims to ensure scalability and long-term sustainability. In D6.3, the for-profit partners within the consortium were identified, and in D6.8, their progress to date is evaluated. All for-profit partners have at least one result. The following table displays the current **9 Key Exploitable Results from IMPETUS for-profit partners**:

ID	Title of the Key Exploitable Results (KERs)	Partners (For-profit partner*)	Demo-site (DS)
1	Sewer Mining technology	EYDAP, NTUA	DS3
2	Satellite-based coastal erosion assessment	LOB	DS2
3	AI downscaling algorithm to assess climate hazard risks at point level	LOB	DS2
4	Heat stress decision support tool	N&S	DS4
5	Flood risk decision support tool and 3D visualization	N&S	DS4
6	Decision support system for integrated water management based on a Digital Twin	WaterJade	DS7
7	Seasonal forecasts downscaling and climate projection downscaling	WaterJade	DS7
8	Decision support tool for industrial decarbonization	WEI	DS4
9	Methodology for the development of regional adaptation pathways	THETIS	N/A

Table 5. List of KERs by the for-profit partners

Following sections are describing each of them in a tabula format.

[5] Strategic Planning - Definition, Steps, and Benefits (corporatefinanceinstitute.com)
[6] Why Is Strategic Planning Important? | HBS Online

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4.1 Key exploitable result 1: Sewer Mining technology (EYDAP and NTUA) [DS3]

KER's market positioning	
Problem identified	Water scarcity, marine storms and biodiversity loss are the climate risks identified and addressed throughout the development of such a solution.
Solution proposed	Wastewater mined from sewers is treated at point of demand while the sludge is also used to produce fertilizer for local agricultural uses. Recent improvements to the technology were achieved by EYDAP and the Municipality of Athens.
Current technological solutions available in the market (state-of-the-art)	N/A
Level of innovation introduced compared to existing products	N/A
Unique Value Proposition - Competitive advantage	The SM technology is an innovative highly replicable water reuse system tailored especially for arid urban environments such as the Med. It is practically a modular and compact wastewater treatment station with a limited footprint (requires limited space). The main principle behind this technology is that wastewater is extracted from local sewers, is treated directly on site and is reused at the point of demand or is stock reserved for when it is needed. As a result, it completely negates the need for expensive water transportation systems which often become a barrier to extensive water reuse especially in dense urban environments. The added value of this particular unit is the fact that it addresses real world water scarcity issues in a dense urban environment, by transforming treated wastewater (a waste) into supply (a resource), increasing the urban resilience towards climate change and providing tangible and tested measures for adaptation schemes and pathways.
Key competitors	N/A
Market barriers (social, economic, technical, etc.)	Needs connection to sewage network, security (e.g., alarms, cameras) and energy connection for power.
Main market applications of the results	N/A
Who are the potential customers?	Municipalities, regions, water companies, tourism industry (e.g., hotels), public facilities, sport facilities, schools, universities, governmental actors, industrial use.
Legal, normative or ethical requirements to be considered	N/A
KER's market strategy	
Foreseen business model	TBD
Early adopters (NOTE: be as concrete as possible)	TBD

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Go to market approach / Action plan (e.g., marketing strategy, commercial approach, etc.).	TBD
Time-to-market (NOTE: you can make assumption if it not clear yet)	TBD
Foreseen product/service revenue stream, price, costs. Investment needed after the project ends. (NOTE: If applies, a forecast of costs and revenues could be included at the end of the table)	TBD
IPR issues	
IPR status	TBD
Owner/s of the result and ownership percentage if applies (x%)	EYDAP & NTUA
Other partners involved in developing the results	N/A

Table 6. Key exploitable result 1: Sewer mining technology

4.2 Key exploitable result 2: Satellite-based coastal erosion assessment (LOB) [DS2]

KER's market positioning	
Problem identified	Coastal erosion has become a relevant problem with tangible effects throughout the Catalan coast in the last years. There is, in general, uncertainty regarding the impact it may have, and which are the most vulnerable areas to the effects of coastal erosion in the forthcoming years.
Solution proposed	• Establish consistent time and spatial coverage of the Catalan coast by combining reliable datasets with optical satellite and synthetic-aperture radar (SAR) monitoring. • Continuously monitor the effectiveness of adaptation measures on the coastline of sandy beaches. • Identify and prioritize erosion hotspots to determine the most vulnerable areas to coastal erosion.
Current technological solutions available in the market (state-of-the-art)	• Drone images: cost-effective to assess the baseline, but they lack the long-term evolution monitoring at an effective cost. Flying drones may need special permissions and specialized experts. • Orthophotography by ICC: Provides long term evolution but lacks enough frequency to track seasonal patterns. • Camera recordings: Do not offer long term evolution. • Topographic studies in situ (e.g. AMB carries it out): Lack of high-frequency data, are not cost-effective, and cannot cover large areas.
Level of innovation introduced compared to existing products	The proposed service will achieve TRL 5-6 in the immediate term, with the potential to advance to TRL 8-9 in the near future.
Unique Value Proposition - Competitive advantage	The solution proposed is a highly scalable product that provides superior temporal resolution compared to other technologies. It provides insights into both the long-term evolution of the coast and seasonal patterns. Moreover, it can be used to either cover large areas or focus on a very specific beach in the coast, providing flexibility to meet diverse user needs.

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Key competitors	• ARGANS (https://argans.co.uk/#gsc.tab=0) • Copernicus might be working on a service soon. However, this will not cover consultancy or point-specific requests. • Most of the information found is related to research initiatives.
Market barriers (social, economic, technical, etc.)	**Governance barrier:** Coastal management decisions are often made at regional/national scale, limiting local municipalities' influence and willingness to invest in the product. **Social barrier:** Satellite solutions are perceived as expensive services based on old prices; current costs have decreased considerably, making the services cheaper.
Main market applications of the results	• Monitoring the impact of adaptation measures such as: manual cleaning, sand traps, breakwater walls on sandy beaches waterline and NBS in general. • Advisory tool for users in need of an assessment of coastal erosion in their beaches or a region including historical evolution with satellite and future climate projections of sea level rise.
Who are the potential customers?	Coastal municipalities, real state agencies, **insurance companies**, tourism businesses (e.g. campsites, hotels), **managers or technicians in natural parks** or protected areas. Coastal infrastructure and Engineering companies (planning or evaluating an intervention).
Legal, normative or ethical requirements to be considered	N/A
KER's market strategy	
Foreseen business model	Data as a Service model.
Early adopters (NOTE: be as concrete as possible)	Municipalities (Santa Susanna, Altafulla, Pals), Regional agencies (service of coastal and beach management offered by AMB, Àrea Metropolitana de Barcelona), Technical Manager of Parc Natural dels Aiguamolls de l'Empordà.
Go to market approach / Action plan (e.g., marketing strategy, commercial approach, etc.).	Our initial focus will be on offering consultancy services to better understand client needs. This will allow deeper learning on the needs of the clients. This understanding will help us refine our product offerings. For reaching a good scale up and profitability, Data as a Service model is the target exploitation route. In this model, clients will subscribe to our coastal erosion monitoring data, receiving regular (monthly/yearly) data updates and ongoing support. Other activities will also be part of our action plan, such as: Develop targeted marketing campaigns to showcase the applications of the monitoring service. Conduct workshops and training sessions to educate potential clients on the benefits and applications of the service. Engage with strategic partners and early adopters to validate and promote the solution. Implement a feedback loop with initial users to continuously refine and improve the service based on real-world applications and client needs.
Time-to-market (NOTE: you can make assumption if it not clear yet)	The launch of the operational service is expected for May 2025. The outcomes of consultancy services will define the details of the operational implementation.
Foreseen product/service revenue stream, price, costs.	Type of products: 1. Consultancy study: Historical study of one beach (one-time consultancy service).

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Investment needed after the project ends. (NOTE: If applies, a forecast of costs and revenues could be included at the end of the table)	2. Beach monitoring (recurring service): Baseline assessment (historical studies and current situation) for planning purposes. 3. Annual contract for data provision (monthly monitoring). Cost structure: 4. Consultancy: Pricing varies based on the project scope, including factors such as the size of the area to be assessed, the depth of historical data analysis required, and the specific client requirements. A detailed quote will be provided after an initial assessment of the project's needs. 5. Monitoring: - Initial one-off setup costs: This includes the cost of setting up the platform for the specific location, initial data collection, and setting up the data processing systems. Typical price between 3000€-6000€ per project. - Yearly Recurrent Costs: Low recurrent fee, calculated based on several factors: Length (km) of monitored beach; Reference points to be monitored (Specific locations along the beach that require detailed observation and analysis); Frequency of data provision (monthly/annual). For local beaches and coastal extensions, the annual price is expected to be between 3000€-6000€/year.
IPR issues	
IPR status	Trade secret or protecting the operational chain side of the methodology.
Owner/s of the result and ownership percentage if applies (x%)	Lobelia
Other partners involved in developing the results	N/A

Table 7. Key exploitable result 2: Satellite-based coastal erosion assessment

4.3 Key Exploitable Result 3: AI downscaling algorithm to assess climate hazard risks at point level (LOB) [DS2]

KER's market positioning	
Problem identified	Climate risk assessment data has currently a maximum spatial resolution of 25-km which is still not tailored for climate hazard assessment at asset level (less than 1 km).
Solution proposed	An AI algorithm trained for the European continent that increases resolution of climate models with (ca. 100km resolution) by using observational point data, and therefore providing high-resolution, asset-level climate hazard assessments.
Current technological solutions available in the market (state-of-the-art)	• Climate models data available in open access do not provide this level of downscaling. • Private providers of climate information or consultancy services may use proprietary downscaling algorithms, but this is not clearly informed or reported.
Level of innovation introduced compared to existing products	TRL 5-6

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Unique Value Proposition - Competitive advantage	The most general approach to downscaling increases resolution through learning the relationship of low- and high-resolution models and provides a raster dataset. This solution will provide downscaled information at asset level making use of ground observed values, instead of reanalysis, therefore representing better the actual conditions in the asset location. Moreover, the service will be validated scientifically and reported in peer-reviewed journals providing the transparency that lacks in the solution of other private providers.
Key competitors	Mitiga, ClimateX, AXA Climate, Jupyter Intel, etc.
Market barriers (social, economic, technical, etc.)	Social barrier: Black box solutions are negatively perceived; clients want to understand the method and AI implemented before buying the service. (Social barrier: Clients often perceive AI-based solutions as "black boxes" and prefer transparency in the methods and AI implementations before purchasing the service.)
Main market applications of the results	Portfolio analysis of climate hazard risks for insurance and investment firms and asset-level risk management.
Who are the potential customers?	Asset managers in public and private organizations, insurance and investment firms, Public and private organizations responsible for climate risk assessments.
Legal, normative or ethical requirements to be considered	As a good practice, once the product is fully developed, the team will carry out the Assessment List for Trustworthy AI (ALTAI). This self-assessment will ensure that users benefit from AI without being exposed to unnecessary risks.
KER's market strategy	
Foreseen business model	Data as a service model / Software as Service.
Early adopters (NOTE: be as concrete as possible)	Global Center on Adaptation (GCA), World Bank, Port of Tarragona.
Go to market approach / Action plan (e.g., marketing strategy, commercial approach, etc.).	This solution will be integrated and promoted as an additional feature of Lobelia. Climate platform and Lobelia's climate data provision services. Given that the platform and services are already established in the market, the new solution will be seamlessly introduced to our existing client base, as soon as it is operational. The new feature will also enable us to expand our client base, as there are specific niches interested in the downscaled data. Other activities will also be part of our action plan, such as: Develop targeted marketing campaigns to highlight the enhanced capabilities of the AI downscaling algorithm. Conduct workshops and training sessions to educate potential and existing clients on the benefits and applications of the new capability. Engage with strategic partners and early adopters to validate and promote the solution. Implement a feedback loop with initial users to continuously refine and improve the service based on real-world applications and client needs.
Time-to-market (NOTE: you can make assumption if it not clear yet)	As soon as the methodology is ready and implemented operationally.

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Foreseen product/service revenue stream, price, costs. Investment needed after project end. (NOTE: If applies, a forecast of costs and revenues could be included at the end of the table)	The prices for this service will depend on two variables: • Number of assets (locations). For very small portfolios, the price will be around €8000/asset. The price per asset will decrease rapidly for larger areas. For example, for 100 assets, the price/asset would be approximately €600. • The complexity of the hazards and indicators needed: some climate indicators require more processing time and the involvement of external information sources. If these are included, a 20% premium will be added to the asset price. Reduced prices can also be offered if the client prefers qualitative values instead of the time series. In the case that a specific indicator outside the standard list of Lobelia is required, it will be quoted separately based on its complexity. The price will also vary depending on the data delivery format: CSV, platform, or consultancy-type report. Additional investment will be needed in the following year to reach operationalization (TRL 8-9).
IPR issues	
IPR status	Trade secret or protecting the operational chain side of the methodology.
Owner/s of the result and ownership percentage if applies (x%)	Lobelia
Other partners involved in developing the results	N/A

Table 8. Key exploitable result 3: AI downscaling algorithm to address climate hazard risks at point level

4.4 Key exploitable result 4: Heat stress decision support tool (N&S) [DS4]

KER's market positioning	
Problem identified	Heat waves are getting longer and more frequent, affecting the infrastructure, health and livability of the region's environment.
Solution proposed	We propose an interactive tool which adaptively generates quantitative insights in the spatially varying heat stress of a region, and the effectives of adaptive measures. The tool can perform computations 'on-the-fly' by utilizing smart raster-computation strategies which are developed within the project.
Current technological solutions available in the market (state-of-the-art)	Currently, only static heat stress maps exist, based on set input variables.
Level of innovation introduced compared to existing products	The developed tool is a novel product and the only interactive tool addressing heat stress in the market (in the Netherlands).
Unique Value Proposition - Competitive advantage	The heat stress Tool enables its users to gain more insights into heat stress in a specific area, under current and future climate

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	settings. Also, it enables its users to quantify the effect of different heat stress reducing measures. This would be helpful for decision makers in spatial planning, when designing new regions and adapting existing cities.
Key competitors	N/A
Market barriers (social, economic, technical, etc.)	Economic budget for climate adaptive plans in relation to the novel concept heat stress.
Main market applications of the results	Support the substantiated decision-making on urban developments to provide a heat stress proof urban environment. The tool quantifies the current challenges and main locations for heat stress and allows new plans and ideas to be quantified before implementation.
Who are the potential customers?	Municipalities, provinces, urban developers.
Legal, normative or ethical requirements to be considered	N/A
KER's market strategy	
Foreseen business model	Licensing model & project-based model.
Early adopters (NOTE: be as concrete as possible)	In our Demo Site we have a few key stakeholders (such as the province Zeeland and the municipality Schouwen-Duiveland). From the beginning both parties have taken a prominent role in our SHE and are extremely interested in our tools. We aim to collaborate with these parties as early adopters. By providing the Heat Tool usage at a discounted/free price, the tool can be used in urban projects, students' research's (MSc) and/or scientific research. The tool can then show its value and display functioning in a practical setting.
Go to market approach / Action plan (e.g., marketing strategy, commercial approach, etc.).	TBD
Time-to-market (NOTE: you can make assumption if it not clear yet)	The time-to-market can effectively start now, within the project, as the product is done. In practice, the time-to-market will start between the present day and at the latest the IMPETUS project's finishing. We aim to find connect adopters as soon as possible and expand our market approach and bring the product to the market afterwards.
Foreseen product/service revenue stream, price, costs. Investment needed after project ends. (NOTE: If applies, a forecast of costs and revenues could be included at the end of the table)	The service will be licensed at a fixed cost per location and duration of the license. It can also be used on a project basis, for which we then set a limited price. The exact pricing and costs for the tool need to be established yet. The heat stress tool ‘as is’ meets the requirements for an advanced heat stress analysis and can be used in national context. Further technical development and expansion of the product (for example, more adaptive measures, adding climate scenarios or usage in international context) must be developed and financed when the need is there.
IPR issues	
IPR status	Digital Assets – Intellectual Property Rights The digital adaptive heat stress tool will act as a standalone application, which utilizes a newly developed raster computation strategy. Both will be the intellectual digital property of Nelen & Schuurmans. The definition of heat stress ('Physiological Equivalent Temperature’) is defined by Wageningen University.
Owner/s of the result and ownership percentage if applies (x%)	Nelen & Schuurmans Consultancy / Nelen & Schuurmans Technology.
Other partners involved in developing the results	N/A

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Table 9. Key exploitable result 4: Heat stress decision support tool

4.5 Key exploitable result 5: Flood risk decision support tool and 3D visualisation (N&S) [DS4]

KER's market positioning	
Problem identified	Flood risks are increasing in a changing climate with heavier and more frequent floods occurring in the last years.
Solution proposed	We propose a software tool that provides insights into the spatially and temporal varying flood risks, and the expected effectiveness of different adaptive measures that can be taken. All visualized in an easy-to-understand manner, coupled to 3D Digital Twins, to allow data-driven decision making. As climate risk is a relatively new consideration in the work of spatial planners and municipalities, IMPETUS is designing a digital decision support system that will provide insights into spatially varying flood risks and the expected effectiveness of different measures that could be taken. This tool will advance integrated flood risk management by combining compelling visuals and rich geospatial data with the predictive power of flood risk modelling. In the Atlantic region, the application of a flood risk model will better enable the investigation of solutions for climate-driven flooding. Our approach: • Build a flood risk model in 3D for the demonstration site region. • Visualization and gamification elements will give clear insight into flood risks and threats; • Translate flood risk simulations into practical, ready-to-use and easy-to-understand information for decision makers in the field of spatial planning and development
Current technological solutions available in the market (state-of-the-art)	No current hydrodynamic software tool allows both scientifically proven flood modelling on sub grid level and visualization of the results in 3D (through a Digital Twin 3D).
Level of innovation introduced compared to existing products	The development of OGC 3D-tiles to visualize flood risks computed by hydrodynamic software is novel in the Netherlands and the first product on the market.
Unique Value Proposition - Competitive advantage	Within the IMPETUS project, we aim to develop '3D-tiles'. This Software development will be built on top of our current 3Di Software and will enable users to visualize their flood simulations in 3D, in a 3D Digital Twin that is a technology with a big focus in The Netherlands.
Key competitors	Deltares (D-Hydro 2D software) & Tygron (2D flood maps in digital twins).
Market barriers (social, economic, technical, etc.)	The present of 3D digital Twins requires partnership with other parties. Additionally, the economic budget for climate adaptive tools is challenging.

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Main market applications of the results	Support the substantiated decision-making on flood risk management and improve climate risk understanding between sectors. The tool quantifies and visualizes the current flood risks in a 3D environment which makes it easily understandable and allows new plans and ideas to be quantified before implementation.
Who are the potential customers?	Provinces, Waterboards, Muncipalities.
Legal, normative or ethical requirements to be considered	N/A
KER's market strategy	
Foreseen business model	Licensing model & project-based model
Early adopters (NOTE: be as concrete as possible)	In our Demo Site, we have several stakeholders. The most concrete partner is the municipality Rotterdam. Rotterdam is the second largest city in the Netherlands, containing the EU's biggest Harbor and functioning as engine to the Dutch Economy. However, it is also prone to flooding. We aim to collaborate with the municipality as early adaptors. This is strengthened by the extensive 3D Digital Twin that Rotterdam has already developed, containing the whole city in 3D, including textures. We have already presented 2D flood risks in this viewer, which we aim to expand with our 3D visualization techniques.
Go to market approach / Action plan (e.g., marketing strategy, commercial approach, etc.).	TBD
Time-to-market (NOTE: you can make assumption if it is not **clear yet)**	The time-to-market can start within 2 months (07-2024), within the project, as the product is almost done. At the latest the time-to-market will be at the IMPETUS project's finishing. We aim to find connect adopters as soon as possible and expand our market approach and bring the product to the market afterwards.
Foreseen product/service revenue stream, price, costs. Investment needed after project end. (NOTE: If applies, a forecast of costs and revenues could be included at the end of the table)	The 3D Flood Tool will be licensed at a fixed cost for the license's duration. This follows similar principles to our 3Di software licensing but acts as an 'add-on'. The tool can also be used on a project basis, for which we then set a limited price. The exact pricing and costs for the tool need to be established yet. The price is also related to the availability and costs of a 3D Digital Twin. The 3D Flooding tool 'as is' meets the requirements for an advanced flood risk analysis and can be used in (inter)national context. Further technical development and expansion of the product (for example, improvement of visualizations, dynamic modelling) can be developed at a later stage after a market analysis as they require extra financing.
IPR issues	
IPR status	Digital Assets – Intellectual Property Rights. The 3D visualization allowing the coupling to a 3D Digital Twin, will be an 'add-on' to the existing hydrodynamic software package 3Di. The software 3Di is the intellectual property of Nelen & Schuurmans as it was developed by the company.
Owner/s of the result and ownership percentage if applies (x%)	Nelen & Schuurmans Consultancy / Nelen & Schuurmans Technology
Other partners involved in developing the results	N/A

Table 10. Key exploitable result 5: Flood risk decision support tool

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4.6. Key exploitable result 6: Decision support system for integrated water management based on a Digital Twin (Waterjade) [DS7]

KER's market positioning	
Problem identified	The primary climate challenges in the Valle Dei Laghi DS are water scarcity and the increasing frequency of extreme storms. To tackle these issues, a more sustainable and integrated approach to water management across various uses is needed. The primary focus is on agricultural water use, particularly for vineyards, as wine production is a significant economic activity in the region. In this context, specific project activities are being undertaken to develop a Decision Support System (DSS) to address these challenges and improve water management across concurrent uses, especially in agriculture, hydropower generation, and drinking water. Main target users: local and provincial water management entities, such as provincial administrations, and irrigation consortia.
Solution proposed	• The back end (digital twin) is a hydrological model leverage local-scale and satellite data, seasonal forecasts, and climate projections; it replicates the water cycle with physical models and machine learning techniques with a flexible approach. • The front-end is a user-friendly visualization dashboard with different sections customized for the different type of users. • The DSS will allow the design of (i) seasonal management strategies to better cope with drought periods and operation of water levels in hydropower reservoirs for energy production in small and large plants; (ii) longer-term management strategies concerning smart irrigation, ecosystem protection and hydropower plants revamping. • The DSS approach is based on a what-if scenario analysis considering different meteorological inputs and parameterization of man-made works.
Current technological solutions available in the market (state-of-the-art)	We need to look more at the available similar solutions, but some DSS for farmers are already developed (e.g. https://www.agricolus.com/tecnologie/dss-decision-support-systems/)
Level of innovation introduced compared to existing products	TRL 4-6
Unique Value Proposition - Competitive advantage	The DSS will improve the integrated medium-term usage plan of water resources and the design of long-term water management strategies concerning different sectors.
Key competitors	Competitors in back-end development: ICS – InsideClimate Service (Italy) (inclimateservice.com): they provide historical analysis and climate prediction services to help businesses related to energy, water and agriculture. DHI (Multinational) (https://worldwide.dhigroup.com/it): multinational corporate specialized in hydraulic modelling generally recognized for the deployment of the MIKE models.
Market barriers (social, economic, technical, etc.)	Issue for users in changing the tool they are used to; problem of gathering data on anthropic works (e.g. hydroelectric

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	infrastructure); issue related to one entity's lack of control over the resource (since it has low priority over other actors).
Main market applications of the results	The DSS can be used by decision-makers but also by more technical users to help them define medium- and long-term climate change adaptation strategies.
Who are the potential customers?	Private users such as farmers; Decision makers such as public authorities; Hydropower companies; Water utilities; Irrigation consortia.
Legal, normative or ethical requirements to be considered	Data ownership, data protection, …
KER's market strategy	
Foreseen business model	Decision Support System service provision through licensing
Early adopters (NOTE: be as concrete as possible)	Public administrations of the Province of Trento; irrigation consortia (e.g. Consorzio di Miglioramento Fondiario Alto Garda).
Go to market approach / Action plan (e.g., marketing strategy, commercial approach, etc.)	TBD
Time-to-market (NOTE: you can make assumption if it not clear yet)	TBD
Foreseen product/service revenue stream, price, costs. Investment needed after project ends (NOTE: If applies, a forecast of costs and revenues could be included at the end of the table)	TBD
IPR issues	
IPR status	A joint ownership agreement between Waterjade and EURAC will be written and details on IP protection will be included in the agreement.
Owner/s of the result and ownership percentage if applies (x%)	TBD between EURAC and Waterjade
Other partners involved in developing the results	• BIM Sarca is involved in defining the functionalities that will be included in the DSS. • Lobelia as regards climate projections.

Table 11. Key exploitable result 6: Decision support system for integrated water management based on a Digital Twin

4.6 Key exploitable result 7: Seasonal forecasts downscaling and climate projection downscaling (Waterjade) [DS7]

KER's market positioning	
Problem identified	Seasonal forecast datasets and climate projection datasets are provided on a global scale and therefore have a coarse spatial resolution (1° x 1° for seasonal data and similar for climate projections where it varies depending on the model).
Solution proposed	For this reason, it is necessary to apply downscaling and bias correction methodologies to the data to localize the information in the specific case study. This is done either by using the observed

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	area weather data or by using re-analysis data such as those provided by the ERA5-land dataset. (https://cds.climate.copernicus.eu/cdsapp#!/dataset/reanalysis-era5-land?tab=overview)
Current technological solutions available in the market (state-of-the-art)	There are currently no commercialized tools to perform this in the market; there are libraries and open-source tools that can be implemented and are used by several companies to do this.
Level of innovation introduced compared to existing products	TRL 5-6
Unique Value Proposition - Competitive advantage	A downscaling algorithm to process seasonal ECMWF ensembled trained on ERA5-land (reanalysis product) and observed data from stations. Use of the latest available techniques of downscaling seasonal data and projection implemented in a Digital Twin that uses them to simulate the water cycle.
Key competitors	Hypermeteo (https://www.hypermeteo.com/)
Market barriers (social, economic, technical, etc.)	TBD
Main market applications of the results	The downscaled results of seasonal or climate projection products can represent a stand-alone result that can be sold to different users for more specific analysis in their sector.
Who are the potential customers?	Hydropower companies, water utilities, research institutes.
Legal, normative or ethical requirements to be considered	TBD
KER's market strategy	
Foreseen business model	Service provision and licensing.
Early adopters (NOTE: be as concrete as possible)	Private industry related groups (Primiero Energia), local and regional water utilities (Viacqua, Comoacque).
Go to market approach / Action plan (e.g., marketing strategy, commercial approach, etc.).	Waterjade won't go to the market with a "pure" weather data product. These datasets will not be flagship products, but they will be included in broader services.
Time-to-market (NOTE: you can make assumption if it is not **clear yet)**	See before.
Foreseen product/service revenue stream, price, costs. Investment needed after project end. (NOTE: If applies, a forecast of costs and revenues could be included at the end of the table)	See before.
IPR issues	
IPR status	To be confirmed: if the IPRs concern the processing part of the data that has to remain private, only the results will be displayed/shared.
Owner/s of the result and ownership percentage if applies (x%)	Waterjade
Other partners involved in developing the results	Lobelia as regards climate projections.

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Table 12. Key exploitable result 7: Seasonal forecasts downscaling and climate projection downscaling

4.7 Key exploitable result 8: Decision support tool for industrial decarbonization (WEI) [DS4]

KER's market positioning	
Problem identified	European policies on mitigation and adaptation to future climate change impacts and reducing greenhouse gas emissions to zero by 2050 have set us on a road to decarbonize industrial processes as much as possible. Identifying decarbonization pathways is crucial in supporting an effective energy transition for EU industry.
Solution proposed	WEI is developing a tool to aid decision makers in making well-informed choices about decarbonization strategies in the Rotterdam port's petrochemical industry cluster. The options that are being considered include waste heat recovery, electrification and hydrogen. The tool under development is being continuously improved in close collaboration with local stakeholders, to reflect their needs and expectations.
Current technological solutions available in the market (state-of-the-art)	Different DSTs are currently available on the market, but not focusing on optimizing decisions for the Rotterdam Port area.
Level of innovation introduced compared to existing products	TRL 6
Unique Value Proposition - Competitive advantage	Suitable for decarbonization, incorporating decarbonization options specific to local conditions (Rotterdam Port area).
Key competitors	N/A
Market barriers (social, economic, technical, etc.)	Lack of data. The data used so far are open access mainly taken from Ministries and TNO (Research Center located in the Netherlands). Possibly confidentiality barriers for data that are being sourced by individual companies.
Main market applications of the results	Decision makers in Rotterdam Port, policy makers in the Netherlands.
Who are the potential customers?	Rotterdam Port companies, possible expansion to other industrial clusters.
Legal, normative or ethical requirements to be considered	Confidentiality of data.
KER's market strategy	
Foreseen business model	Consultancy.
Early adopters (NOTE: be as concrete as possible)	Industrial cluster in Port of Rotterdam (Nobian, Shell, etc.).
Go to market approach / Action plan (e.g., marketing strategy, commercial approach, etc.).	Testing the preliminary version with potential clients / try-outs to receive feedback for potential improvements, prior to using this for commercial purposes (consultancy).
Time-to-market (NOTE: you can make assumption if it not clear yet)	2-3 years.

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Foreseen product/service revenue stream, price, costs. Investment needed after project ends. (NOTE: If applies, a forecast of costs and revenues could be included at the end of the table)	N/A
IPR issues	
IPR status	Trade secret (source code will remain closed and property of WEI).
Owner/s of the result and ownership percentage if applies (x%)	WEI (100%).
Other partners involved in developing the results	N/A

Table 13. Key exploitable result 8: Decision support tool for industrial decarbonisation

4.8 Key exploitable result 9: Methodology for the development of regional adaptation pathways (THETIS) [all DS]

KER's market positioning	
Problem identified	In the face of climate change, the risks associated with its impacts are becoming increasingly evident. To effectively address these challenges, a crucial element is identifying adaptation strategies tailored to various climatic conditions. Regional adaptation pathways emerge as a particularly valuable tool in this regard. They require us to consider evolving scenarios, helping communities and organizations across the diverse climatic regions of the EU to build resilience in a proactive and adaptable manner. This approach ensures that responses to climate impacts remain effective and relevant as conditions change.
Solution proposed	Development of a step-by-step methodology to assess alternative adaptation pathways across the seven biogeographic regions of IMPETUS (Mountain, Coastal, Arctic, Mediterranean, Continental, Boreal, Atlantic). The methodology is designed to be adaptable and scalable, supporting long-term decision-making and resilience-building in different contexts. This solution leverages existing knowledge to create a tailored approach that recognizes the unique characteristics and climate risks of each EU region.
Current technological solutions available in the market (state-of-the-art)	The concept of adaptation pathways is well documented in scientific and technical literature. Review scientific papers and technical guidance documents are available, also including examples of adaptation pathways used by policy makers to address specific climate challenges. However, pathway approach, design and visualization significantly differ case by case, preventing a straightforward uptake from regional and local administrations
Level of innovation introduced compared to existing products	**Tailored Flexibility**: The methodology is highly adaptable, specifically designed to function effectively across diverse biogeographic regions with varying climate risks, data availability, and modeling capabilities. The methodology is intended to maximize the use of “performance-threshold-oriented” pathways whenever possible, by encouraging the use of quantitative data

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	to feed indicators and to assess adaptation options and pathways. However, it recognizes the key role of multi-stakeholder discussion in providing information, defining goals, tipping points, and adaptation options that can lead to different directions of adaptation pathways and different visions of the future. Finally, the methodology recommend to incorporate non-structural actions (new governance settings, knowledge tools and financial mechanisms) into adaptation pathways, as key enabling factors of adaptation. **Dynamic Process**: The proposed use of a stepwise approach makes iterative adjustments of adaptation pathways more straightforward. The iterative process is based on evolving conditions and on new information and monitoring results that gradually become available. It introduces a dynamic element to the adaptation process. This contrasts with more static or rigid adaptation plans that may not accommodate changing circumstances effectively.
Unique Value Proposition - Competitive advantage	The methodology is crafted to be adaptable across different IMPETUS demo sites, each facing unique climate risks and varying levels of data availability. Its flexible, stepwise approach ensures that it can accommodate the specific needs and conditions of each region, from initial objective setting to the assessment of alternative pathways. **Transferable and Scalable**: While specifically designed for the IMPETUS project, the methodology is intended to be a general tool applicable beyond the project's scope. Its flexibility allows for adaptation in various contexts, supporting long-term decision-making for climate change adaptation globally.
Key competitors	N/A
Market barriers (social, economic, technical, etc.)	Possible market barriers related to the adoption of the adaptation pathways concept include its limited recognition and understanding as a tool for managing climate change and adaptation. A significant challenge is the lack of data to fulfil all envisaged steps and the lack of awareness among decision-makers about the benefits and applications of this methodology. This gap in awareness can hinder the tool's uptake and integration into planning and policy-making processes.
Main market applications of the results	**Main market applications refer to local and regional government planning.** Cities and municipalities can use the adaptation pathways methodology to develop strategies for identifying the most urgent adaptation actions on infrastructure, public services, and urban environments. At a higher level, regional authorities can apply the methodology to tailor adaptation strategies to specific climatic challenges and vulnerabilities of their areas. The stepwise approach to adaptation pathways is designed to be nested in the main adaptation cycle undertaken by regional and local authorities and can be easily mainstreamed in adaptation strategies and plans.
Who are the potential customers?	Governance authorities: municipalities, regions, and their advising organizations (e.g. researchers, consultants, government agencies)
Legal, normative or ethical requirements to be considered	N/A
KER's market strategy	
Foreseen business model	TBD

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Early adopters (NOTE: be as concrete as possible)	TBD
Go to market approach / Action plan (e.g., marketing strategy, commercial approach, etc.).	Our initial focus will be on offering consultancy services on tailored adaptation pathways. The methodology can be downscaled if needed to highlight local specificities
Time-to-market (NOTE: you can make assumption if it is not clear yet)	TBD
Foreseen product/service revenue stream, price, costs. Investment needed after project end. (NOTE: If applies, a forecast of costs and revenues could be included at the end of the table)	Foreseen products: **Consulting and Advisory Services**: offering tailored consulting services to local and regional governments, NGOs, and other stakeholders for developing and implementing adaptation pathways. **Training and Workshops**: training sessions and workshops for stakeholders on how to use and apply the adaptation pathways methodology. Revenue stream, price and costs should be tailored to the type of service provided
IPR issues	
IPR status	TBD
Owner/s of the result and ownership percentage if applies (x%)	THETIS SPA
Other partners involved in developing the results	N/A

Table 14. Key exploitable result 9: Methodology for the development of regional adaptation pathways

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5 Conceptualization of the RKBs strategy development

As introduced in the methodological approach presented in section 2, the RKBs strategy development from an exploitation perspective is an important pillar of the results exploitation in IMPETUS. This is due to the strong emphasis on the potential replicability that RKBs should have. For that reason, the value proposition and governance models are under construction together with the work done in WP1.

This section includes the work that has been done in WP6 regarding the exploitation strategy for RKBs. However, it is important to mention that in the forthcoming months of the project, this exploitation pillar will make stronger efforts to end up with a complete exploitation strategy for each RKB when the project finishes.

5.1 SWOT Analysis per DS

In the Plenary Meeting celebrated in Bolzano, the EUT team organized a workshop with the aim of having an overview from Demo-site leaders about the strengths and weaknesses the organizations participating at a regional level have. In parallel, positive and negative external factors present in the region were also asked for in such activity. The output of this session was collected in the form of a SWOT Analysis which helped the participants to classify the different items that have regionally, both internal and external ones.

The interactive activity was presented as the following figure shows:

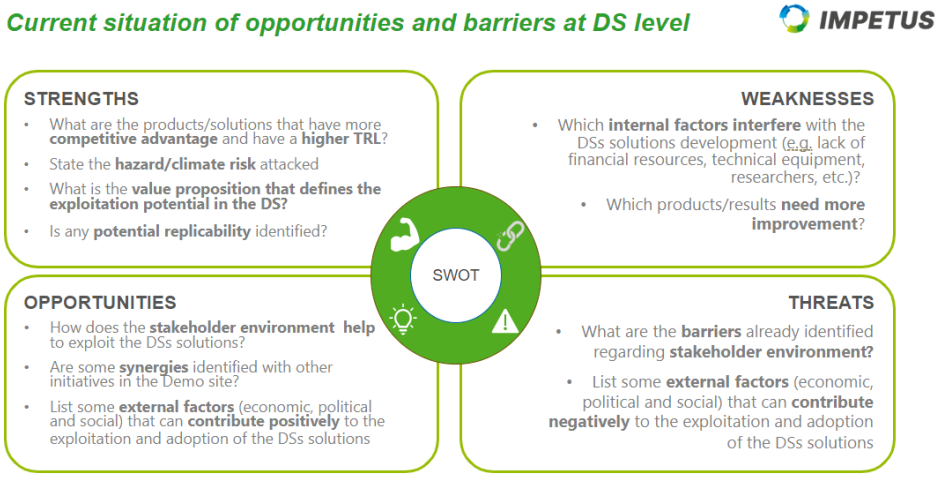

Figure 10: SWOT analysis of a DS

Each Demo-site leader had the SWOT Analysis template to complete and the WP6 team provided guidance on the activity as well as suggestions that helped participants to provide this overview of the current situation of opportunities and barriers which in turn represent **the exploitation dynamics and potential at DS level**. The resulted SWOT Analysis per Demo-Site are shown below, and they are included together with some valuable insights and aggregated conclusions that will help the Exploitation team to configure the value proposition and other important items for the strategic exploitation development of RKBs (governance and business models, potential replicability, etc.).

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SWOT Analysis DS1 – Continental: Berlin-Brandenburg, DE

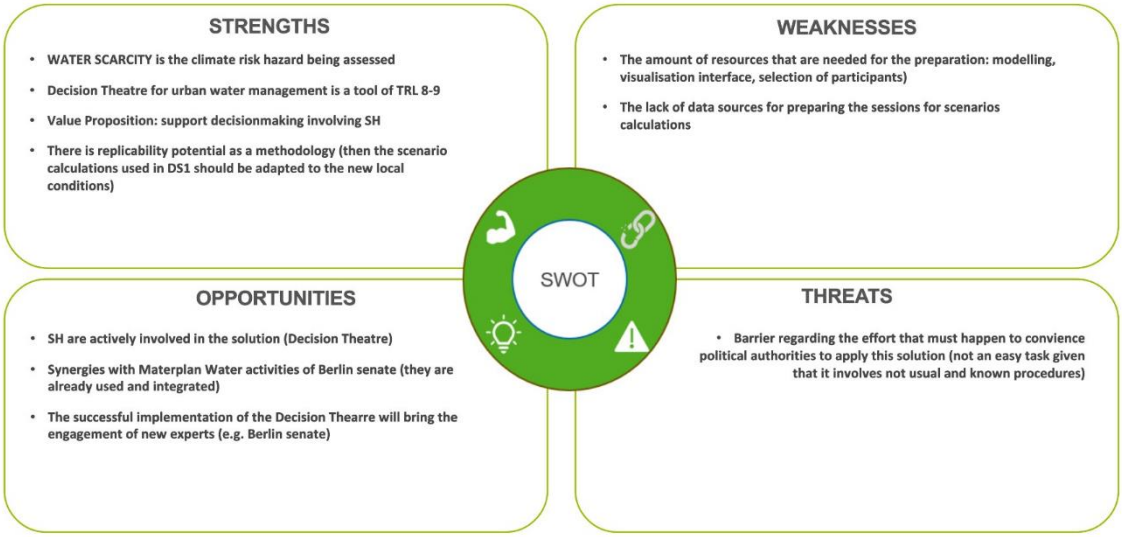

Figure 11: SWOT analysis DS1, Continental

In the Continental Demo-site it is important to remark on the Decision Theatre tool given its high TRL and the active regional stakeholder's engagement present for the development of such a result. Besides them, it is expected to engage other potential stakeholders within the region as there are predictions towards a successful implementation of the tool (for instance, it is manifested in the potential engagement of the Berlin senate which has a high level of power and resources). This in turn can lead to potential replicability happening, although there is manifested that replicability and scalability in other different regions remain more at a methodological approach rather than the complete deployment of the tool. This last weakness is due to the level of data that is required to prepare the number of calculations needed for the different scenarios within the management of urban water in a particular place.

Having said that, it is valuable to have public administration engaged in a region to ensure the application of tools like the one being developed in this Demo-site. This task can be quite complex as political authorities do not understand the technical implications but once it is achieved, the uptake of such a tool to the market may be more straightforward. In other words, the successful implementations together with public urban planners' authorities can incentivize private companies dealing with water scarcity to adopt the more matured methodology and scale the solution developed in other regions in which they operate.

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SWOT Analysis DS2– Coastal: Coast of Catalonia, ES

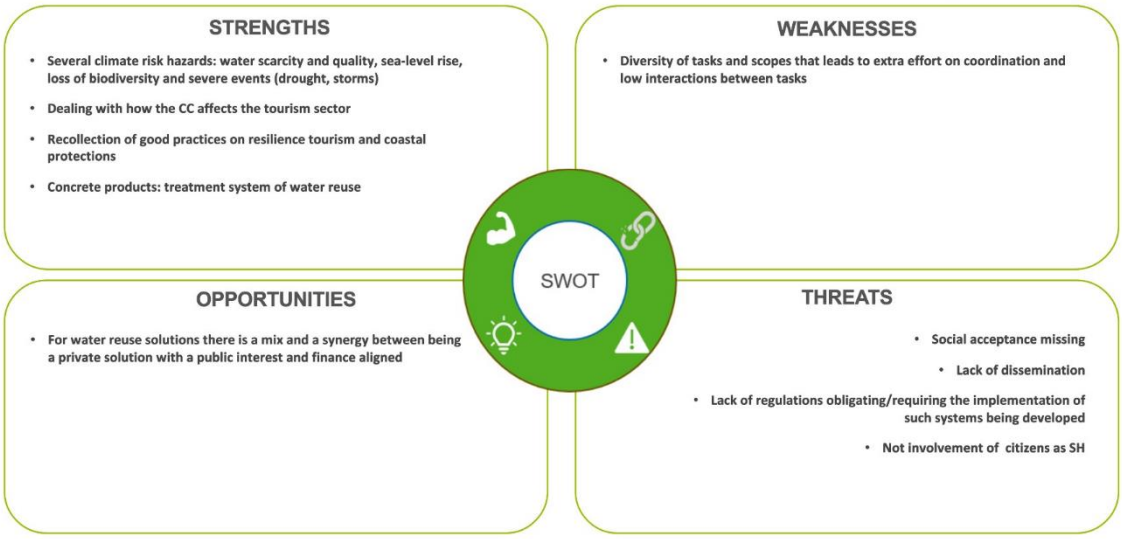

Figure 12: SWOT analysis DS2, Coastal

For the Coastal Demo-site there are many results and products arising from the IMPETUS project, which addresses a set of diverse climate risk hazards such as water scarcity and quality, sea-level rise, loss of biodiversity and severe events. This implies complexity for the coordination and communication among the different agents involved in this region, given the diversity of the tasks and scopes of each ER. However, if there has been a clearer definition of roles, liabilities and communication flows, this RKB could configure a strong value proposition for climate change adaptation and mitigation solutions. This is because, as previously stated, there are several climate risk hazards covered, and it differentiates from other regions in the project where only one or two climate hazards are addressed. Apart from diversity in climate hazards, there is a collection of good practices in important economic sectors for the coast of Catalonia as, for example, the emergence of resilience within the tourism sector.

Taking into consideration the external factors manifested, it is important to establish a dissemination strategy targeted at the different types of actors that constitute the ecosystem in this region. Additionally, a lack of regulations was manifested during the analysis, which can lead to a more difficult implementation of such innovations. Other external threats that were commented on include the low levels of involvement of citizens as stakeholders, as well as the lack of social acceptance for the innovations in this region. Therefore, for exploitation matters, the potential business opportunities that may arise must be communicated to engage private agents to scale the technological solutions developed. Lastly, an opportunity arising from the DS2 water reuse solutions is the alignment of interests and finance given that it consists of a private solution but with a public interest.

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SWOT Analysis DS3– Mediterranean: Region of Attica, GR

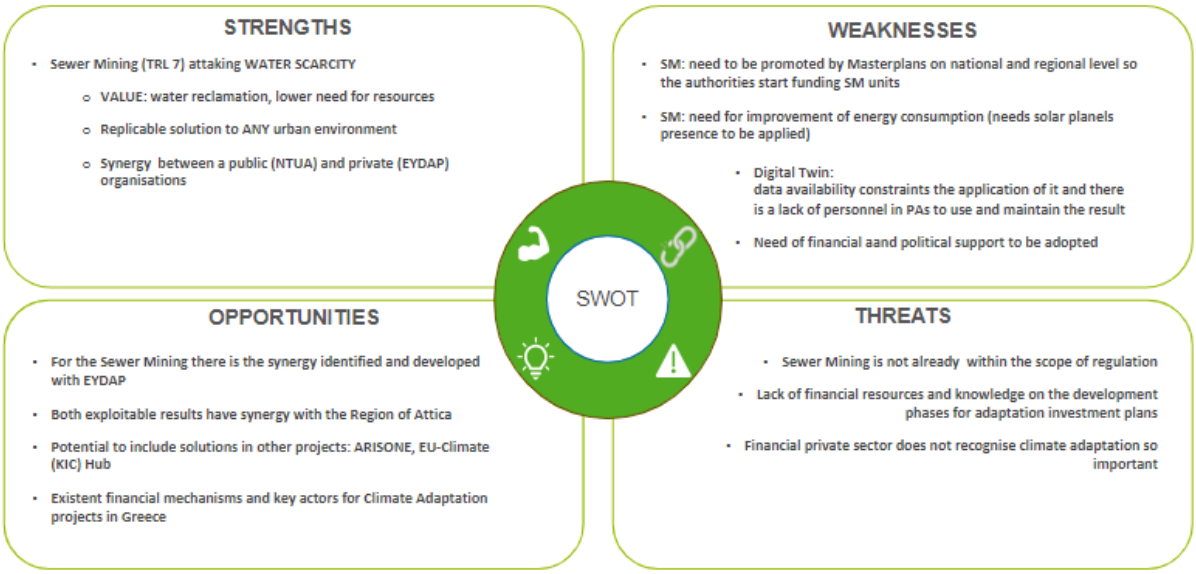

Figure 13: SWOT analysis DS3, Mediterranean

For the Demo-site present in the Region of Attica (Greece), there is a special focus on the Sewer Mining technology development. From an exploitation perspective, it is relevant as it represents one of the results in the project with high potential scalability and replication. For that, the Sewer Mining with a high TRL and attacking water scarcity is manifested as a great strength within the DS. Moreover, the potential replicability that technology has for any urban environment is an added value that should be emphasized to attract potential stakeholders located in order regions. However, there is a trade-off that configures a weakness to such development, as the SM needs to improve regarding the actual high level of energy consumption to run. Besides this, the results being developed in this DS also face financial and political barriers as they need to be actively supported by other agents in the ecosystem.

Considering external factors present in Greece, there are many organizations managing European initiatives that can be used to include such solutions to ensure financial sustainability and increase dissemination. Also, there are existing financial mechanisms and key actors involved in Climate Adaptation projects at the national level. However, they miss private sector representatives mainly from the financial sector.

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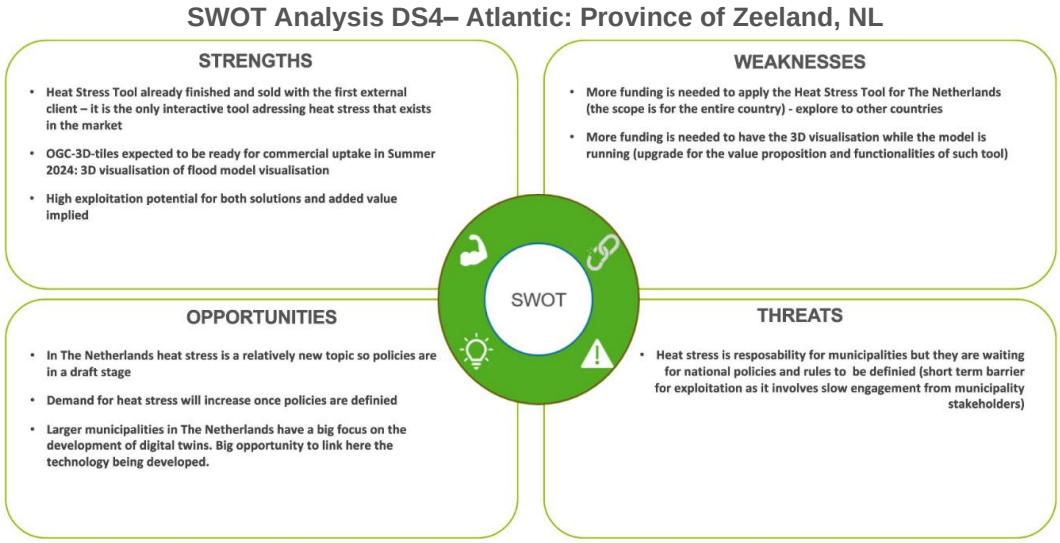

Figure 14: SWOT analysis DS4, Atlantic

For the case in this Demo-site, business presence and needs were already at the beginning of the project since the types of agents involved in this region are primarily private companies. This induces more potential for exploitation as this has been a priority from the beginning and, in the present moment, the majority of ER are ready for the uptake to the market. In particular, the Heat Stress Tool represents a powerful competitive advantage as it is the only interactive tool that addresses such climate hazard risk in the market. However, it cannot be forgotten that for scalability and replication, other types of innovation agents must be engaged. Then, from a short-term point of view, there is this external threat arising from the slowness of municipality stakeholders to deal with heat stress as they are waiting for a national public framework to happen. On the other hand, this means that once these national policies on heat stress are well-defined, the technological solutions (e.g. Heat Stress Tool) will be ready to meet the potential increase in demand. Besides this mentioned tool, for replication in other countries, more funding is needed as there is a high level of resources involved to make the exploitation of the solutions in this Demo-site possible in other geographical locations.

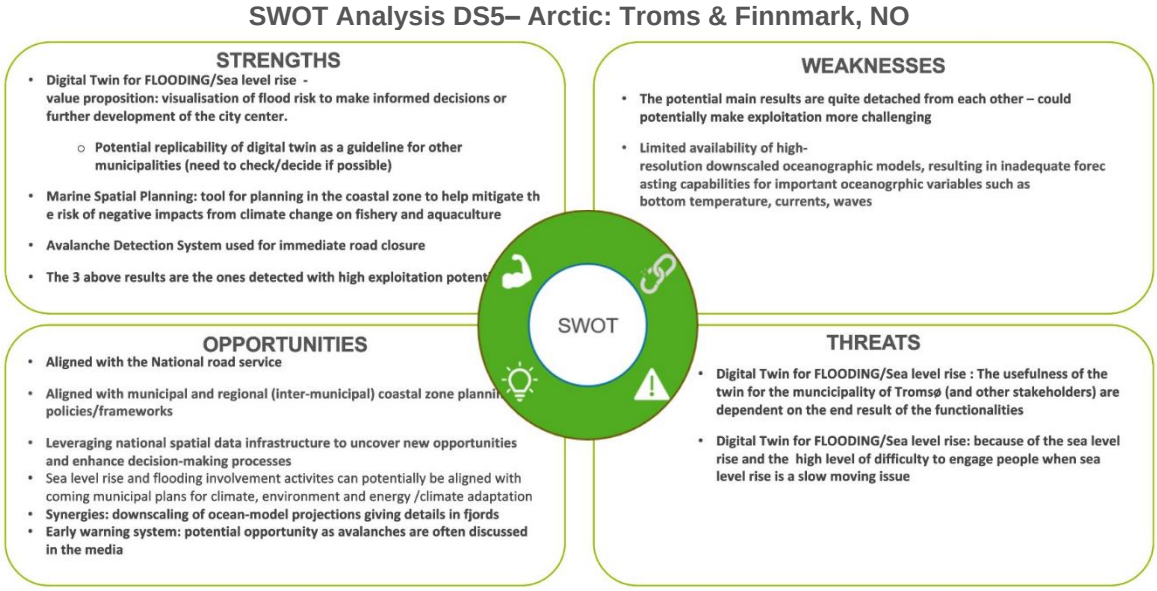

Figure 15: SWOT analysis DS5, Arctic

Analyzing the information gathered above for the Arctic Demo-Site, there are 3 results detected with high exploitation potential. Although there are no potential synergies identified between them, there are some positive external factors present in the region that may foster their scalability separately. On the

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one hand, for instance, the Digital Twin is aligned with the needs that public bodies in municipal and regional coastal planning have. On the other hand, for Marine Spatial Planning there is potential interest from the private sector to have guidance on how to mitigate the business activities performed by companies within the fishery and aquaculture industries. Last, the Early warning system deals with avalanches, a climate risk hazard very popular in the media currently. However, there are some negative external factors to have in mind for the fostering of such solutions: they all cover climate risk hazards that are not noticed easily by people (for example, the sea level rise must be trusted throughout projections). A further negative external factor concerns the usefulness of these solutions for the region, as it depends on their final outcomes.

SWOT Analysis DS6– Boreal: Zemgale region, LV

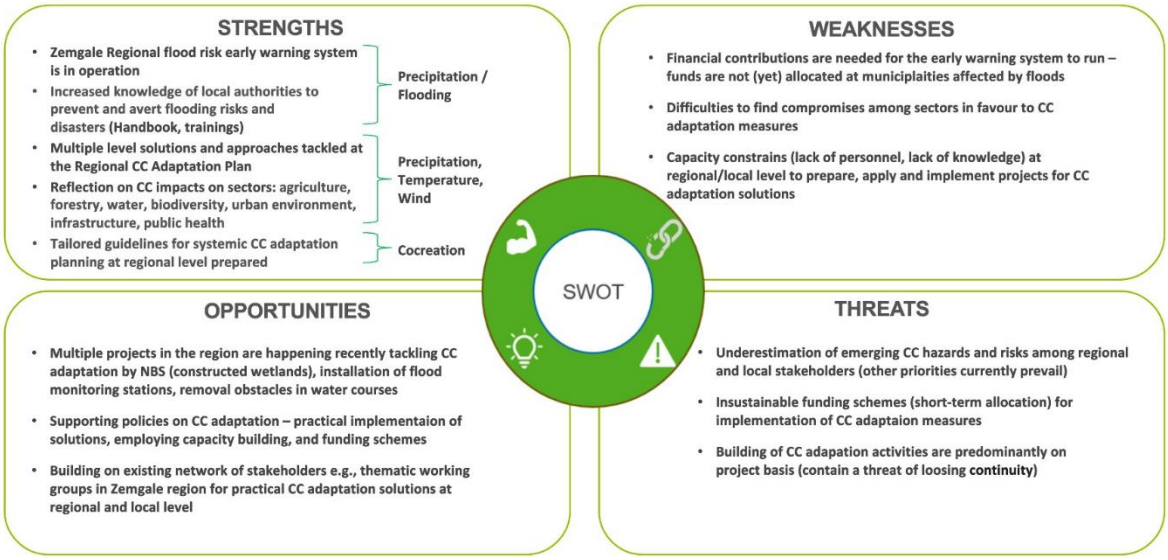

Figure 16: SWOT analysis DS6, Boreal

The demo-site taking place in the Zemgale region has this powerful combination of technological solutions development together with the elaboration of guidelines, handbooks and training materials. This facilitates the achievement of stakeholders and social engagement as it involves efforts to increase knowledge and awareness of the potential benefits of such solutions. Moreover, the co-creation process happening for the design of tailored guidelines for systemic climate change adaptation planning is a valuable result. This leads to a higher level of engagement of potential exploitation users, although some barriers are coming from difficulties, they may have to find engagement among private sectors to work under the climate change adaptation measures suggested. Other barriers include capacity constraints, such as the lack of knowledge, which can hinder the development and implementation of climate adaptation solutions. Also, the lack of financial contributions for the early warning system poses further weaknesses.

Considering the external factors, there are multiple projects in the region dealing with the same climate risk hazards (precipitation, flooding, high temperatures and wind). This, in turn, can lead to potential synergies to have a more complete adaptation and mitigation exploitable plan. However, there is no linear funding for the actual implementation of climate solutions as financial resources allocation tends to be more short-term focus. This is also related to the fact that these solutions are commonly developed in the scope of individual projects and therefore, long-term sustainability is usually underestimated.

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SWOT Analysis DS7– Mountains: Valle dei Laghi, IT

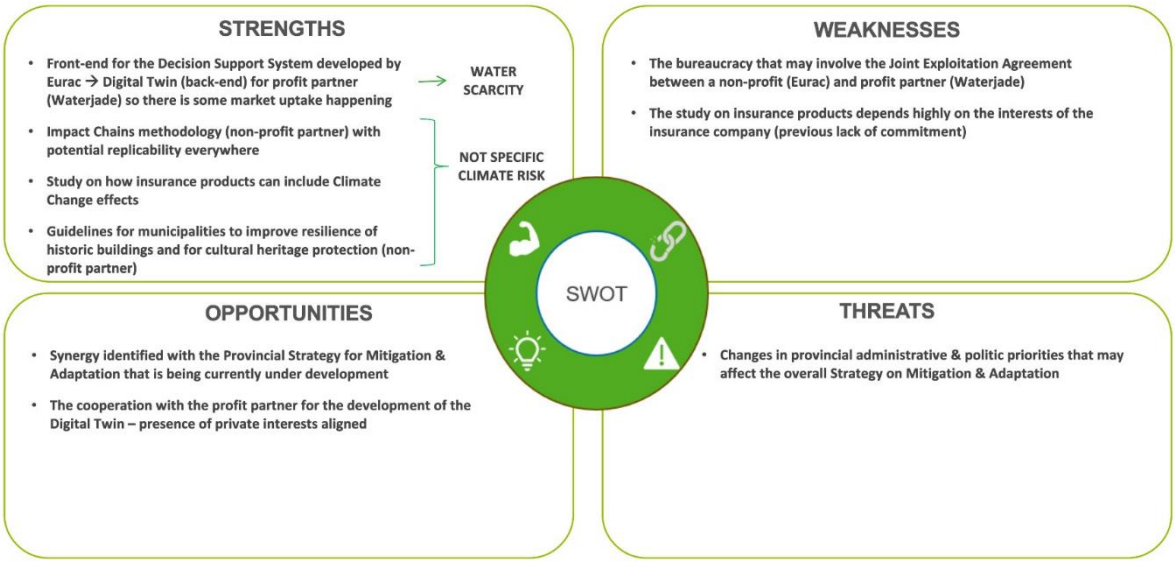

Figure 17: SWOT analysis DS7, Mountains

In this demo-site there are some solutions developed that do not deal with specific climate risk hazards. This can be interpreted as a lack of positioning, but the powerful pathway is that they configure some methodologies and guidelines on climate change adaptation that can be potentially replicated in other geographical places. For instance, guidelines on how to improve the level of resilience of historic buildings and cultural heritage in municipalities. There is one solution, the development of a digital twin, aimed more specifically at addressing the water scarcity problem, which is being developed by a profit partner and is being introduced in the market. However, some bureaucratic issues may arise as there are both non-profit (Eurac) and profit (Waterjade) partners involved in the Joint Exploitation Agreement for this solution. T8.4 will foresee the agreement of these partners over a smooth uptake of the solution in the market.

Considering now the external factors, a synergy with the Provincial Strategy for Mitigation & Adaptation was identified, which enhances cooperation for the development of the solutions. Further cooperation is seen as an opportunity in the development of the digital twin, given that the private interests of the profit partner are identified and aligned with the interests of the non-profit partner. Nonetheless, some negative factors were also addressed, with potential changes in administrative or political priorities that can impact on the Strategy on Mitigation & Adaptation.

5.2 Resilience Knowledge Boosters (RKBs)

The **IMPETUS Resilience Knowledge Booster (RKB)** is a multidisciplinary community of actors (the “Human Dimension”) supported by a digital platform (the “Digital Dimension”) designed to enhance regional climate resilience through integrated data, models, and expertise. The RKB platform facilitates stakeholder engagement and co-creation. As a network, it promotes knowledge exchange and enables successful climate adaptation approaches to be shared across communities, ensuring broader and more effective climate resilience strategies.

As collaborative spaces, it is designed to unite all relevant stakeholders to co-create, demonstrate, monitor, and assess climate adaptation pathways for sustainable adaptation and resilience. These boosters, besides a human dimension, integrate a virtual/digital dimension, incorporating climate-change-related data, knowledge, and experiences to fuel innovative ideas, share research, and promote data and knowledge exchange among stakeholders and regions throughout the co-creation process.

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Thus, RKBs function as a collective of individuals and decision-makers who utilize digital tools and online platforms, including climate projects, tools, and solution examples, to inform and drive decisions on climate change adaptation actions. The RKBs encompass both the human and technological dimensions, creating a comprehensive environment for effective adaptation and resilience planning.

The digital dimension of the RKBs is developed and led by WP2 (EUT) and aspects such as the architecture, the functional framework and the main needs and requirements, from a technical perspective can be found in D2.1.

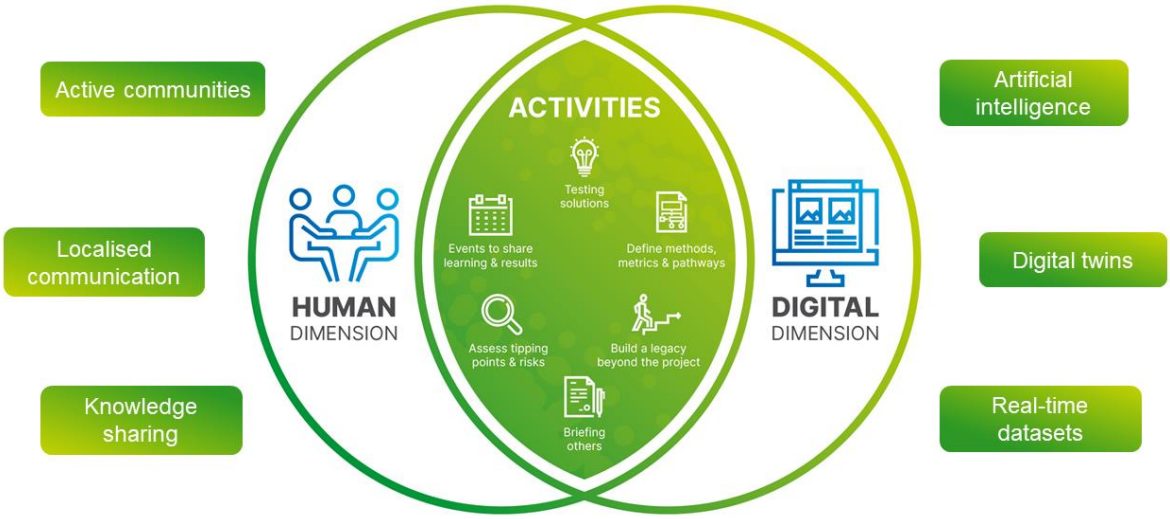

Figure 18: Conceptual framework of human and digital dimension of the Resilience Knowledge Boosters. Source: D2.1

The role of RKBs in the exploitation of IMPETUS solutions is crucial and must be considered. Our ambition is for IMPETUS to continue beyond the funding period by establishing consolidated, interconnected RKBs and communities across various scales. These will be built upon a solid foundation of co-creation and stakeholder engagement process developed through WP1, WP6, and WP7.

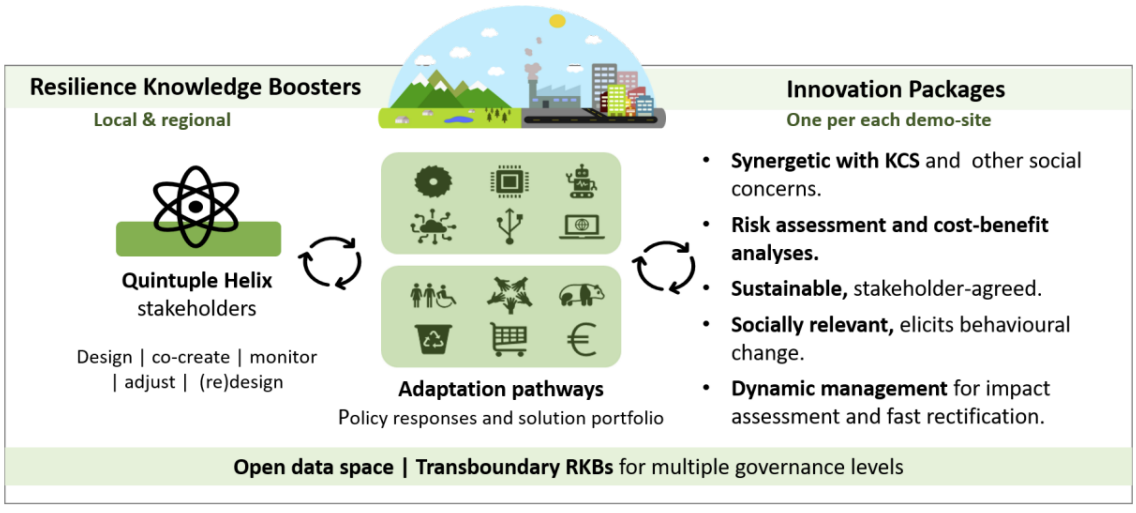

Figure 19: RKBs conceptualization. Source: IMPETUS PartB

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5.2.1 Potential governance models for RKBs

The Resilience Knowledge Boosters (RKBs) of IMPETUS provide climate adaptation solutions to relevant quintuple helix stakeholders through its human and digital dimensions. Beyond offering tools and services, IMPETUS employs a multi-level approach to bridge gaps between various governance levels. The RKBs provide a dual approach: top-down strategies that adapt policies and directives to local and regional specificities, and bottom-up initiatives that use policy and market analysis (WP6) to provide guidelines to decision-makers (D6.4, D6.6) and inform EU policies (D6.10), ensuring the effective deployment of innovative climate adaptation solutions and the creation of appropriate incentives.

To ensure the long-term sustainability of the RKBs, it is key to first conduct a governance analysis for each RKB. This analysis will identify opportunities and gaps that each model can offer to the DS to be considered for decision-making. The governance analysis has been built upon the report named *Policy instruments and modes of governance in environmental policies of the EU*[7].

This report introduces the set of **policy instruments** and **modes of governance** mostly used in environmental policies of the EU and displays the differences between these two concepts. Further on, it classifies five different typologies of governance models.

These will be firstly described next and after, a qualitative analysis will be carried out by WP1 and WP6 governance experts. This analysis serves as an initial reflection on the SWOT analysis presented at the last PB by the DS regarding exploitation, SHE, and sustainability. Different governance models have been considered and analyzed based on the information gathered through the SWOT analysis of each DS. The recommendations provided are solely based on this information and the current situation of each DS, without further validation from DS experts. The next steps will be outlined at the end of this subsection.

Hierarchical governance is a top-down approach in which decision-making takes place at the higher levels of authority. Consequently, the rules and norms imposed are passed down to those with lower levels of power.

Hierarchy has been typically used in the organization of firms or governments as mentioned in this same report, therefore suggesting that it is a common model of governance that has been widely considered over time. However, it poses some disadvantages if the allocation of authority and responsibilities is unclear. Another weakness of the model is in terms of innovation, which may be hindered due to the tendency to be more resistant to change.[8]

Unlike the previous model, **network governance** uses a more decentralized approach in which different groups of actors representing diversified interests and perspectives participate in the decision-making process. This way, as the name suggests, a network of actors is created to cooperate when defining policies. The report highlights that, in this type of governance, interdependency, reciprocity, and cooperation are among some of the important principles to consider.

An issue arising from **network governance** is the possibility of conflicts between actors when making decisions given their differences in interests and the lack of an authority figure. Additionally, it is highlighted that this form of governance may require an important use of resources due to the frequency of meetings that have to be organized between actors.

According to the report previously mentioned, the **market model** is based on the market and its principles of competition and pricing for making coordinated decisions. This way, the demand and supply of the different actors meet at an equilibrium in which an efficient exchange is achieved. Apart from firms in the private sector, the public sector can also implement this model by introducing these market mechanisms which include competition and pricing.

In the **self-governance model**, the actors have the autonomy to govern themselves. It is not as typically used as other models, and hence the limited availability of information on self-governance, but poses

[7] Policy instruments and modes of governance in environmental policies of the European Union (wur.nl)
[8] Types of Governance Models: Exploring Different Approaches - CxO Toolbox

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several advantages in terms of incentivizing actors to have more initiative, responsibility and engagement.

The **knowledge model** refers to the governance of knowledge processes so that new ideas and perspectives are created as opposed to the more traditional ones, leading to fostering innovation. Thus, under this type of governance, actors participate in a knowledge process concerning current problems or situations to find innovative solutions. Later, the learnings made are typically communicated to third parties who can benefit from them.

Finally, in many situations, the models previously defined tend to merge into **hybrid governance models**, the characteristics of which are composed of a mix of different types. Thus, it may be the case that a single governance model is not accurately fit for a solution, but what is needed is a combination of different models altogether.

In the IMPETUS project we are working with 7 DS that represent 7 out of the 11 biogeographical regions of EU. During the Project Board (PB) meeting in March 2024, a workshop was held to assess the strengths, weaknesses, opportunities, and threats (SWOT) of these DS in terms of exploitation. The results of this workshop will be reviewed and analyzed, with additional insights drawn from lessons learned and experiences to date.

The analysis on the potential governance models for the RKBs included in this subsection constitutes a preliminary version, of which the further steps need to be defined. As previously mentioned, the governance models have been extracted from a report and then considered for each DS while considering the current situation in each case, always from a theoretical perspective. The main goal of this section is to compare the different possible governance models with the realities observed in each DS, to observe which modes emerge. Thus, this current analysis of WP1 and WP6 governance experts has been based on the RKB mock-ups and on the SWOT analyses for the exploitation of the solutions in each DS.

On this line, it is expected to be extended and validated by the Consortium and both the DS leaders and DS partners in October (M37), and it will continue to be developed collectively. Validation from external stakeholders will also be considered in the future, through the Stakeholder Engagement (SHE) activities expected to take place towards the end of the project.

5.2.1.1 Governance analysis for DS1

DS1 refers to the continental DS, covering the metropolitan area of Berlin-Brandenburg in Germany. According to the SWOT analysis, this DS and its RKB benefit from the potential involvement of numerous stakeholders thanks to the dynamic sessions of the decision theatre. Additionally, synergies with the Berlin Senate are already in place, particularly through the development of the Masterplan Wasser (masterplan for water activities), with their experts expected to participate in future decision theatre activities. However, some barriers may hinder effective governance models, such as the lack of sufficient data sources for technological progress and the significant resources required. A lack of engagement from public authorities is also a potential threat that must be addressed. Based on this input, hierarchical **governance**, while effective in many situations, may be too rigid for the growing ecosystem of SHs in DS1. Its rigidity could stifle innovation and adaptability-both crucial for water management and local adaptation in such a dynamic context.

Alternatively, **network governance could be a more suitable approach, as it fosters cooperation** and interdependence between private and public stakeholders in DS1. However, potential challenges such as data availability and the absence of clear leadership could hinder full participation by all agents. A **knowledge governance model, on the other hand,** could incentivize collaboration and drive innovation in water management. Yet, its vulnerability to political changes might obstruct the deployment of solutions and misalign R&D with political timelines.

Given that DS1 is still focused on R&D and tool testing, the **market model** may not be the best fit at this stage, especially with the private sector being less engaged than the public sector. A **hybrid form of governance** could also be a viable option, combining the strengths of the network and the knowledge governance. At this stage, **self-governance** seems inapplicable to DS1, with other models offering more opportunities given the current situation and SWOT analysis.

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5.2.1.2 Governance analysis for DS2

The Coastal DS2 (Catalonia, Spain) offers a wide range of tools and other products focused on several climate risk hazards (e.g., sea level rise, water scarcity and quality, etc.) and problematics (e.g., coastal erosion, the effect of tourism, etc.). That is why the involvement of SHs is key to ensuring the creation of proper governance structures that can ensure the sustainability of the relationship created at IMPETUS between agents.

The diversity of tasks and scopes in DS2, mentioned in the SWOT analysis, implies an extra effort on coordination that could be detrimental to fostering interaction, suggesting that the hierarchical model would be difficult for this case. Based on the ecosystem of DS2 agents, the **network model** could better adapt to the topics on the table and allow different voices and views to be integrated. For instance, for water reuse the private and public SHs are interested in creating synergies and the financial and viability of the solutions is clear. For this reason, the results of the SWOT would indicate that the **market model** could make sense for DS2, if the solutions developed are demanded by the private sector and the offer can continue to improve to ensure that the interests are aligned.

Based on the information gathered, the **self-governance** is not the optimal solution for DS2 at this stage, as the relationships between stakeholders still need to be strengthened and aligned toward a common goal, which has yet to be clearly defined. However, similar to DS1, the **knowledge model** could be a good fit for the coastal DS, given the emerging synergies between agents and the importance of the tools being developed. The climate adaptation solutions from DS2, such as those addressing coastal erosion, dune restoration, and water quality, could facilitate decision-making for both public and private stakeholders. At this stage, a hybrid model could also be considered, blending the advantages of the market, network, and knowledge models to leverage the opportunities they provide.

5.2.1.3 Governance analysis for DS3

The Mediterranean DS (Attica Region, Greece) is constituted by strong foundations in terms of SH engagement and collaboration between the public and private sectors for the deployment of the solutions. The products and technologies being developed have a high TRL and count with feedback from a private water management company such as EYDAP. The synergy between the company and universities is being developed and is meant to continue after the project ends. Moreover, there are also other synergies with EU projects that have tested interesting solutions for the ecosystem.

DS3 is working also on the development of master plans for water energy at national and regional levels that can enable the implementation of innovative solutions. These plans aim, among others, at fostering regulation and ensuring financial and political support. For instance, the skilling of the public sector at using digital solutions (e.g., digital twin) is key for the management and maintenance of CA solutions. that have skills to manage and maintain solutions such as the digital twin.

The established and robust network of stakeholders within DS3 could create an ideal environment for considering a governance model based on a **network model**. This model would allow exploitation of the current relationships and set common goals to explore the involvement of other stakeholders. However, given the leadership of universities and their skills in terms of business development, water management tools, and economic perspectives, a **hierarchical governance model** could be also considered. The central role of universities suggests that a **knowledge-based model** could be suitable for the DS3, as the solutions developed are ensuring the acquisition of relevant know-how and the validation of methodologies.

Based on the SWOT, the **market model** may be still far from the reality of the region, and the masterplans and business plans for solutions such as the SM units need further validation. **Self-governance** appears unsuitable for this region, as the interdependence of stakeholders is critical to an effective governance framework. A **hybrid model**, combining the strengths of hierarchical and network approaches, could be key to success. This model could ensure a structured environment while maintaining a level of democratization that fosters innovation without hindering it.

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5.2.1.4 Governance analysis for DS4

The Atlantic DS from the Netherlands present many opportunities for governance and exploitation of the solutions and SH involvement for the future. The heat stress tool for instance is already being commercialized and digital twins are becoming a key element for large municipalities. Also, the 3D visualization of the flood model is ready for commercial uptake. However, policies are still in the draft stage regarding heat stress, as this is a relatively new topic, and more funding is needed to apply the heat stress tool at a national level (or EU). The 3D visualization tool for flooding could be further upgraded with new functionalities.

In terms of multi-level governance, municipalities are waiting for national policies and rules to be defined. Thus, despite that heat stress is the responsibility of the municipalities, the different layers of PA lead to a slow engagement of municipalities. Based on this SWOT analysis, the **hierarchical governance** may not be the best option for DS4, as the leadership of a private company may create obstacles to collaboration with PA. Instead, network **governance** would ensure a more suitable cooperation between the different types of stakeholders and facilitate the exchange of insights between the agents.
The **market model** could make sense also for the Atlantic DS, as the SWOT analysis suggests that the TRL of the products is very high, and the public sector has a demand for digital twins and heat stress tools to carry out its decision-making. This fact could represent an opportunity for the creation of public-private partnerships and blended financed mechanisms. Moreover, the replicability of the tool could also be a direction that would imply the investment of resources to improve decision-making at a national level.

Self-governance would not make sense for this DS, as the interlinkages between partners are a driver that should be exploited. The knowledge model could perhaps be suitable if the **hybrid model** combines the network and/or market models. However, due to the high TRL of the solutions, a market model ensuring validation and replicability would be more innovative than only ensuring knowledge exchange.

5.2.1.5 Governance analysis for DS5

The DS5 is located in the Troms & Finnmark region in Norway and is characterized by offering climate adaptation solutions with high exploitation potential (e.g., a digital twin for flooding, a marine spatial planning tool and an avalanche detection system). Some opportunities revealed in the SWOT analysis were regarding the alignment of the solutions with the country's policies, both at the regional and national levels. For instance, the marine spatial planning tool may support district planning policies in fishery farms and the digital twin is relevant for the inter-municipal coastal zone planning policies and in general. Moreover, the IMPETUS solutions help to leverage existing national spatial data infrastructure to facilitate decision-making by policymakers.

However, some weaknesses mentioned are the detachment between solutions, as they are tackling different climate hazards and the lack of financial resources to continue developing the results. SHE is also challenging and, the involvement and prioritization by public authorities of matters such as avalanches, and the implementation of adaptation plans to cope with sea level rise and flooding. Moreover, for the Digital Twin solution, the analysis mentions a limited availability of adequate models for forecasting oceanographic variables such as waves and currents.

Taking the SWOT analysis into consideration, the **network governance model** may not be a good fit for DS5 given that it requires high levels of coordination and interdependence for its well-functioning, and the detachment between the solutions may hinder such cooperation. Moreover, the lack of involvement of stakeholders may also be detrimental, as it implies mobilizing many resources that are limited currently.

On the other hand, considering the alignment of the solutions with policies, the **hierarchical model** could be considered in this case. The university has had an important role in coordinating the efforts of the implementation of CA solutions, and until the public SHs are engaged, this could be an effective strategy. As for the **market model**, it could also be a good option due to the high exploitation potential of the three solutions, contemplated in the SWOT exercise, which could be separately deployed to the market. This governance model would allow considering 3 parallel directions or technical groups that explore collaboration opportunities according to the specific climate hazard.

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Finally, the **knowledge-based model** may be suitable for the DS if the collaborative space for SHs allows the exchange of data and information that can help to the acquisition of input by universities. Therefore, they can be available to continue developing solutions and are able to result in adequate forecasting capabilities for oceanographic variables (current barrier).

As for other DS, the combination of governance models could be one of the most suitable solutions, taking into account the current situation in DS5. A hierarchical model to continue dynamizing and involving stakeholders, but also a market model oriented towards the exploitation of solutions, that knowledge-based can ensure the exchange of data between the agents. The self-governance model is at this point not as considered due to the lack of stakeholder engagement.

5.2.1.6 Governance analysis for DS6

Several solutions addressing the main climate impacts are currently being developed and implemented in DS6, located in the Zemgale region in Latvia. These solutions combine technological innovations as well as guidelines and planning to address CA, and the SWOT analysis highlights that there is an important network of shareholders engaged in the solutions.

However, the need for financing is a recurring issue and there are difficulties in getting some sectors involved in CA. A lack of knowledge about CA measures and other capacity constraints hindering the implementation of the solutions were identified as weaknesses in the SWOT analysis.

Bearing this in mind, the **network governance** could be adequate given the opportunity for SH engagement. The existence of multiple projects tackling CC in the region offers an opportunity to open collaboration and exchange best practices. Policymakers are asking for support to develop CC adaptation plans (e.g., capacity-building, funding schemes, practical implementation of NBS) and there exist already, networks of stakeholders working in different thematic groups in the region.
For the **hierarchical model**, the information gathered from the SWOT indicates that the leadership for this model may be unclear.

Moreover, as there are other network structures and projects, the **network model** could be more suitable in terms of cooperating to orchestrate the CA ecosystem and inform policies. Such a model is adequate considering the engagement of numerous SHs for CC adaptation solutions in DS6, which was identified as an opportunity.

Regarding the **market model**, at this point, it may not be the recommended option due to the stage of CA policies. The Latvia region is still going through the elaboration of plans and policies, and the market uptake of solutions might not be a current priority.

On the other hand, considering the current implementation of new climate-related policies and plans addressing mitigation and adaptation, the **hierarchical governance** could be potentially applicable. A clear leadership could drive a faster decision-making. However, as already mentioned, it can be complex to determine the project or entity that should be leading the model. In the case of the boreal DS, the **knowledge governance model** could be relevant if combined with the network governance, to facilitate the exchange of information between entities and projects. The **self-governance model** may be at this point still too disruptive for the current status of the region in terms of SHs and CA.

5.2.1.7 Governance analysis for DS7

The Mountain DS7, located in the Valle dei Laghi in Italy, tackles the water scarcity hazard and, for this matter, a Decision Support System and a Digital Twin are being developed jointly by for-profit and non-profit partners. Furthermore, other solutions tackling impact chain methodology, insurance companies' consideration of CC risks and the improvement of the resilience of historic buildings and cultural heritage are being undertaken.

The SWOT analysis suggests that the collaboration between the different partners in the Joint Exploitation Agreement can allow for an alignment of interests, but this may also lead to problems of bureaucracy. The need for negotiations and approvals can create delays. For the context of DS7,

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currently, despite the bureaucracy mentioned, **network governance** could be more suitable rather than the **hierarchical model.** Synergies with provincial strategies for CM and CA are identified and the involvement of SHs would be thus easier. Moreover, private interests are also aligned with the activities of the DS and their results. However, administrative and political priorities may affect the orientation of the CC strategies and create uncertainty.

Alternatively, a **market model** could be suitable due to the involvement of a for-profit partner in developing Digital Twin, which may have an interest in market uptake. A **hybrid possibility** combining the market and network model could be recommended for this DS. This approach would ensure that private sector needs are integrated into the design of solutions, facilitating market transfer and ensuring that project outcomes align with the interests of all partners.

Finally, the **self-governance model** could be discarded for the current situation of DS7, as first, the present governance structure needs to ensure the involvement of all SHs before transitioning to a more innovative model based on SH proactiveness.

5.2.1.8 Summary

To finalize the governance models subsection for the RKBs in the different DS, a table summarizing key aspects developed previously has been included. All considerations and recommendations are still susceptible to changes before the final report.

As a final note and introduced at the beginning, this exercise is a hypothetical analysis from a theoretical perspective of governance models that could be compatible with the current dynamics of the DS, based on the SWOT analysis. This will need future review of the SHs involved in the DS and after the project ends, the sustainability of the different structures created will validate in practical terms what are the most recommended models for the impact to be created.

DS	Recommended governance models based on the SWOT analysis	Key considerations
Berlin-Brandenburg, Germany	Network, Knowledge, Hybrid (Network + Knowledge)	Hierarchical model may be too rigid; network governance could promote cooperation but may face data availability issues; hybrid model leverages collaboration and innovation.
Catalonia, Spain	Network, Market, Knowledge, Hybrid (Network + Market + Knowledge)	Hierarchical model may struggle with coordination; network model integrates diverse views; market model could align with private sector demand; hybrid model combines strengths.
Attica Region, Greece	Network, Hierarchical, Knowledge, Hybrid (Hierarchical + Network)	Strong SH engagement; network model leverages existing relationships; hierarchical model benefits from university leadership; hybrid model balances structure and innovation.
Atlantic, The Netherlands	Network, Market, Knowledge, Hybrid (Market + Network + Knowledge)	Hierarchical model may hinder collaboration; network model promotes cooperation; market model aligns with high TRL products; hybrid model combines validation and innovation.

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Troms & Finnmark, Norway	Hierarchical, Market, Knowledge, Hybrid (Hierarchical + Market + Knowledge)	Network model may struggle due to solution detachment; hierarchical model could be effective for coordination; market model viable for exploitation; hybrid model ensures data exchange.
Zemgale, Latvia N	Network, Knowledge, Hybrid (Network + Knowledge)	Hierarchical model unclear; network model fosters SH engagement; market model not yet applicable; hybrid model supports information exchange and policy development.
Valle dei Laghi, Italy	Network, Market, Hybrid (Network + Market)	Network model may be suitable despite bureaucracy; market model aligns with private sector involvement; hybrid model ensures market transfer and SH involvement.

Table 15. Summary of governance models recommendations and considerations

5.3 Strategy development for RKBs

The strategy for the different Resilience Knowledge Boosters (RKBs) will be elaborated by integrating insights from the SWOT analysis presented in subsection 5.1 with findings from reports D6.4 and D6.6. This integration aims to create a comprehensive and actionable plan that addresses the identified strengths, weaknesses, opportunities, and threats associated with the RKBs.

The definitive roadmap for RKB exploitation and continuity will be detailed in the final deliverable D6.9. This roadmap will outline the necessary steps for the effective implementation and long-term sustainability of the RKBs, ensuring that they continue to provide value and impact beyond the funding period.

In addition to the roadmap, the strategy will highlight the various economic, social, and business benefits of the RKBs, as described in the DoA. The economic benefits include potential cost savings, economic growth, and job creation that arise from successful climate adaptation initiatives. Socially, the RKBs may contribute to enhanced community engagement, improved quality of life, and greater public awareness of climate resilience. From a business perspective, RKBs offer opportunities for innovation, market expansion, and a competitive edge for businesses involved in CA solutions.

The overarching goal of strategy development is to provide actionable insights that will guide the future exploitation of the IMPETUS project. This includes recommendations for operational improvements, enhanced stakeholder engagement, and the scaling of successful practices. By synthesizing the SWOT analysis, report findings, and a detailed examination of benefits, the strategy will deliver a clear framework for advancing the RKBs' objectives and ensuring their continued relevance in climate resilience efforts.

Name of the RKB		
Description of the RKB	Geographical scope:	-
	Digital dimension:	Description of the digital tools, platforms, and technologies utilized
	Human dimension:	Overview of stakeholder engagement, including both engaged and planned stakeholders.
Governance model chosen and explanation		
Benefits / Positive externalities	Economic benefits:	//
	Social benefits:	//
	Environmental benefits:	//
Summary of the SWOT analysis	Strengths:	//
	Weakness:	//

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	Opportunities:	//
	Threats	//
Strategic planning	Mission:	The mission statement describing the core purpose and objectives.
	Vision:	The vision statement outlining long-term aspirations and goals.
	Key partners:	Essential SHs and collaborators.
	Main lines of work:	Primary focus areas and operational themes of the RKB.
	S/t actions:	Actions to be implemented within 1-3 years
	L/t actions:	Actions to be implemented within 4-5 years

Table 16. RKB Strategy Template

6 IMPETUS Multi-Sided Platform (MuSP)

During the last year, the EUT team (WP6, WP7) led the conceptualization of the IMPETUS Multi-sided platform in close collaboration with ESCI (WP7) and with the support of THETIS (WP5). This work has been validated iteratively with project partners and there have been spaces generated to create discussion, propose ideas and boost creativity among the members.

6.1 Methodology

In this section, the methodology and timeline for the **theoretical conceptualization** of the IMPETUS MuSP platform will be explained in detail spanning from July 2023 to March 2024. Beyond this point, the conceptualization has continued through meeting with the technical teams of ESCI and EUT to translate the concepts into viable functionalities and elements.

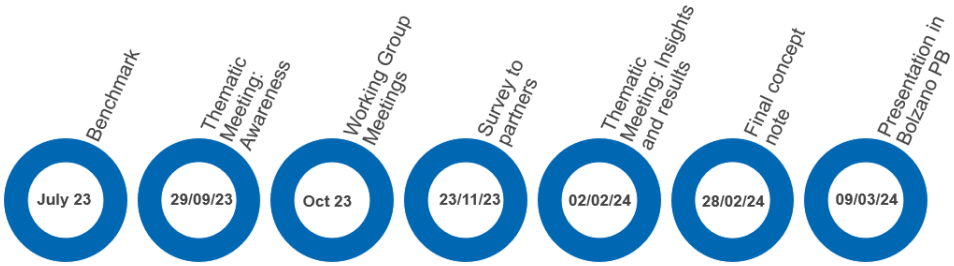

Figure 20: IMPETUS Platform Conceptualization - Timeline

The process of conceptualization of the IMPETUS MuSP platform started with the elaboration of a benchmark of similar platforms that could inspire relevant features and functionalities. Platforms such as Climate-adapt, Climate Innovation Window, Nesoi, Pharos4MPAs, Climate Europe2, Clarity – H2020 and Water Europe were analyzed. The dimensions analyzed in this research were the targeted end-users, the functionalities, the main content, the business model (if applicable) and the ecosystem around the platform.

At an initial stage, the IMPETUS platform was presented in a **thematic meeting** organized on Friday the 29th of September of 2023. IMPETUS partners could participate in this open session to understand more deeply the value added that the multi-sided platform has for the project. In other words, the main objective was to create awareness of the conceptualization that we were starting among the consortium members.

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After this initial meeting, we defined a **working group** that would be more involved in the day-to-day definition of elements of the platform and be responsible for their validation with the project partners. This working group had 8 members: Josep Pijuan (EUT), Iván Cester (EUT), Sebastiano Carrer (Thetis), Chiara Castellani (Thetis), Elisa Andreoli (Thetis), Gustavo Jacomelli (ESCI) and was led by Maria Zaragoza (EUT) and Laura Armayones (EUT).

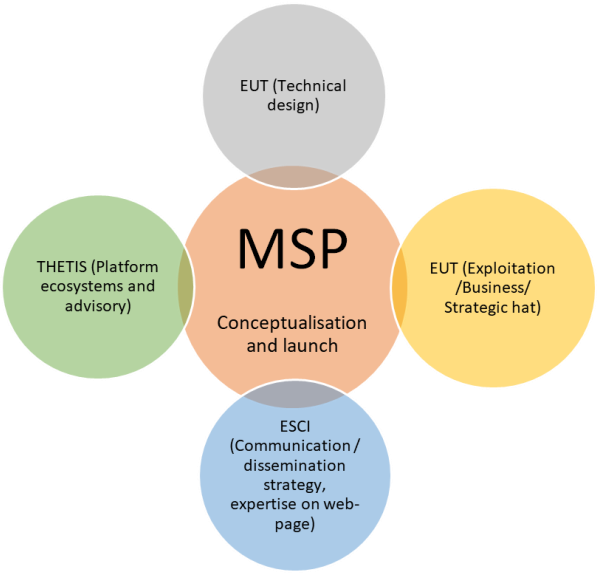

Figure 21: Roles of partners in the IMPETUS Platform working group

The working group organized different meetings to advance conceptualization and decided to use the **survey tool** to achieve more engagement and have the major number of comments received by the partners. Also, to receive quantitative feedback to orient the next steps of the platform. Once the survey results were analyzed, on the 2nd of February of 2024 the main insights to the whole consortium on a thematic session were presented.

33 answers from 23 organizations were collected on 14 questions surveys via *Forms*. The questions followed different formats (open-ended and closed-ended) and allowed us to validate the interest of the partners on the platform, whether they agreed with the targeted users and the main functionalities that the platform should contain.

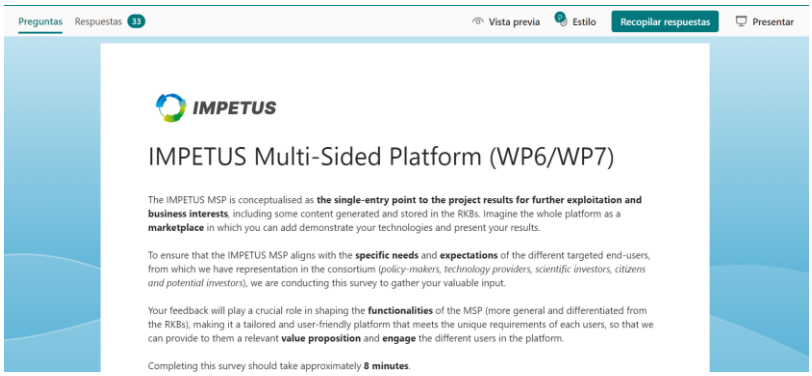

Figure 22: IMPETUS Platform Survey - Forms

To collect the final conceptualization, a concept note was created and shared with the consortium on the 28th of February of 2024, to provide information regarding the final decisions made based on the survey results.

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After the concept note, EUT and ESCI started to work on the technical side of the platform. The teams got together and discussions regarding the integration with the IMPETUS webpage were carried out. At the Bolzano Project Board Meeting held between the 6th and the 8th of March, all the progress was presented in-person to the WPL and the DSL.

6.1.1 Results of the IMPETUS Platform survey

As previously introduced, the survey distributed to the IMPETUS partners considering the conceptualization of the IMPETUS Multi-Sided Platform (MuSP) consisted of 14 questions. The answers collected were 33 and belonged to 23 out of the 32 partners in IMPETUS. Thus, the participation rate was higher than 70%.

According to the organization typology of the respondents (Q1), the majority of respondents belonged to universities and RTOs. In the second place, there were public authorities (5 respondents) and SMEs (4 respondents) and finally, with lower representation we had large enterprises and dissemination, advocacy and global strategy partners (2 respondents each). In **Q2,** partners indicated the name of their organization.

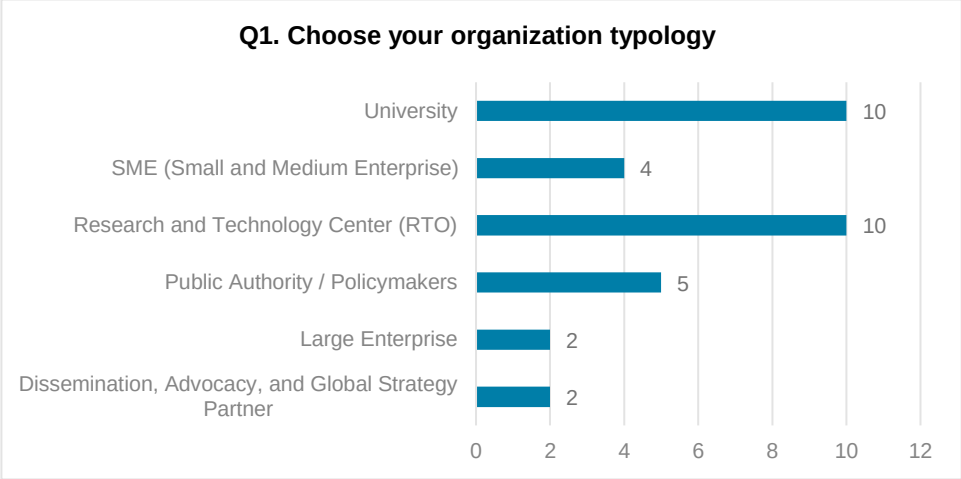

Figure 23: Survey results: Q1. Choose your organization typology

To ensure the awareness of partners regarding the IMPETUS platform, the initial question (**Q3**) asked about their awareness of the project's requirement to create a Multi-Sided Platform (MuSP). The results, displayed in a pie chart below, indicate that a significant majority, 73%, were not aware of this aspect of the project, while only 27% of participants were informed. The organization of thematic sessions, the sharing of a platform concept note, and the survey were focused on the awareness' increase and on the need to have a participative co-creation process of the platform.

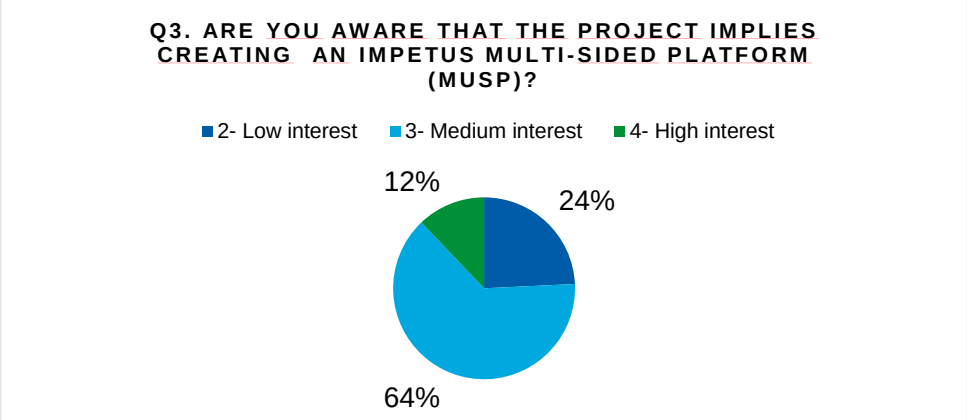

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Figure 24: Survey results: Q3. Are you aware that the project implies creating an IMPETUS Multi-Sided Platform (MuSP)?

The following question (**Q4)** assessed the **level of interest** among partners in using the MuSP as a marketplace. The results, depicted in the bar chart below, reveal varying degrees of interest. A significant portion of participants, 21 respondents, expressed a medium level of interest in utilizing the MuSP for this purpose. In contrast, a smaller group indicated either high (8 respondents) or low interest (4 respondents). This distribution suggests that while there is a general interest in the marketplace functionality, opinions on its overall value are diverse, with some stakeholders showing more interest than others.

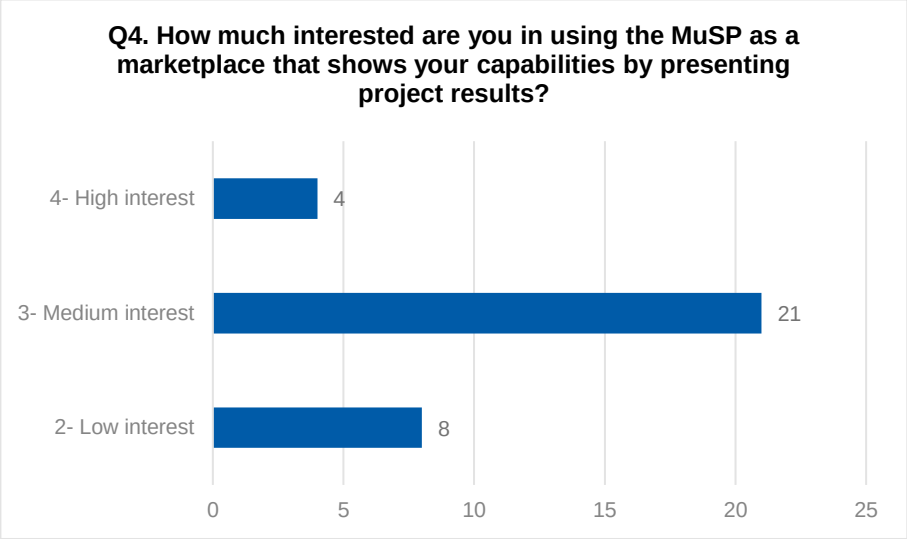

Figure 25: Survey results: Q4. How interested are you in using the MuSP as a marketplace that shows your capabilities by presenting project results?

Next, the project partners were asked to rank the potential general functionalities of the MuSP based on their preference on a 1-to-5 scale, where 5 would be most important and 1 least important.

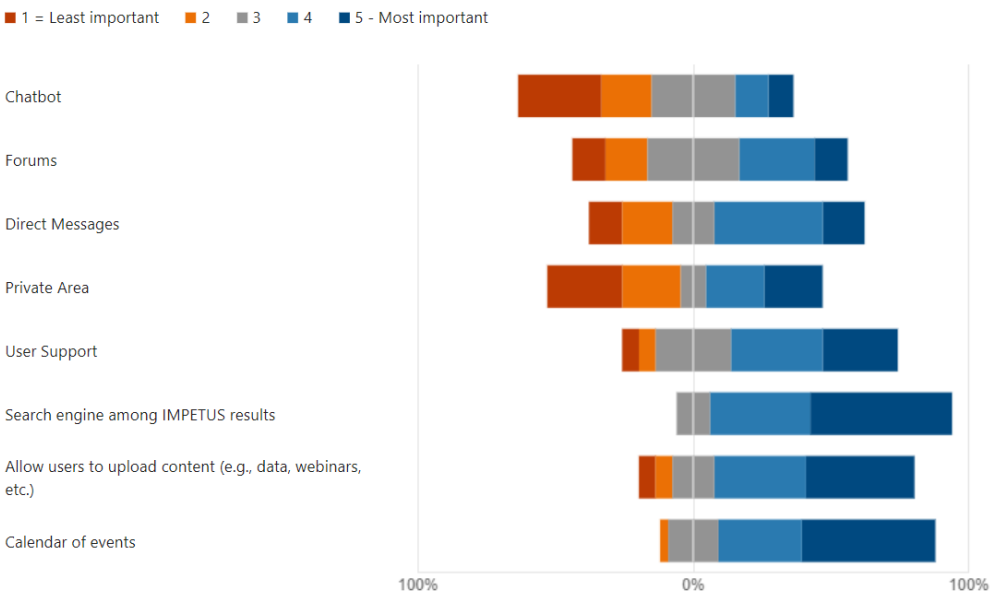

Figure 26: Survey results: Q5. Rank the following functionalities from least to more important (1-to-5 scale)

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Besides the general functionalities ranked by partners, they were asked whether any specific functionality not mentioned could be beneficial and attractive for the MuSP (**Q6**). One notable suggestion was the introduction of matchmaking capabilities among stakeholders, enabling more effective connections and collaborations within the platform. Another important feature proposed was providing access to results from sister projects, ensuring users can easily find and utilize related research and data. Respondents also highlighted the potential benefits of connecting the MuSP with other initiatives led by organizations such as the EC, which could foster greater integration and knowledge sharing across different projects.

To complement the current benchmark, when asked about **similar platforms** in ***Q7*** respondents cited examples such as the EnergyMatching Marketplace, Nesoi, the Water Europe Marketplace, and the Clarity H2020 Marketplace.

The survey also explored the **value propositions** that the IMPETUS Platform could offer to different user groups, due to its multi-sided nature.

For the **general public** considered in ***Q8*** *What value proposition can we offer to the citizens / general public visiting the MuSP?* respondents emphasized the importance of raising awareness and providing access to information, particularly about climate change and adaptation solutions. This theme was mentioned 15 times, with participants stressing the need for showcasing success stories, visualizing data, and ensuring the public can engage with climate adaptation efforts. Training and capacity building were also highlighted as crucial elements, with respondents suggesting the platform offers guidance and detailed information through structured programs.

Community engagement emerged as another key value proposition mentioned 13 times. Respondents highlighted the need to connect the public with project results in a way that is accessible and meaningful, facilitating engagement through open access and collaborative decision-making processes. Networking opportunities, though mentioned less frequently, were still considered important, providing citizens with a marketplace for climate adaptation tools and a space to share innovative ideas. Advocacy for climate change measures and the provision of real-time data were also noted as valuable offerings for the public.

Theme	**Key Points**
Awareness and Access to information (15 times)	- Raising awareness about climate change and adaptation solutions. - Visualizing data and providing access to real-time data. - Showcasing success stories. - General awareness about the platform's offerings. Offering open access to information. – Stay updated of the climate solutions - Ensuring that the public can understand and participate in climate adaptation efforts.
Training and Capacity Building (6 times)	- Emphasis on training and capacity building for effective platform use. - Providing advice, guidance, and detailed information through training programs.
Community Engagement (13 times)	- Community engagement as a crucial aspect. - Connecting them with the project results in a level of detail that the general public can understand. - Facilitating engagement through open access, showcasing success stories, and collaborative decision-making. – Provide meaningful experiences
Networking (2 times)	- Creating a marketplace for climate adaptation tools. - Networking opportunities for citizens to collaborate and share innovative ideas.
Advocacy (5 times)	- Advocacy for climate change measures. - Public acceptance of climate measures to reduce risk. - Providing a platform for citizens to engage and take part in climate adaptation at local and regional levels.
Real-time Data (2 times)	- Providing real-time data and information for citizens to stay updated about climate solutions.

Table 17. Analysis of the answers to Q8: What value proposition can we offer to the citizens / general public visiting the MuSP?

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For **Q9**. Regarding the value proposition offered to **scientific experts**, the survey revealed that access to research data and results is of paramount importance, cited 9 times by respondents. Experts would benefit from exclusive and early access to findings, accompanied by clear and concise explanations. Collaboration opportunities were also highly valued, with participants expressing a desire for more avenues to exchange experiences and knowledge with peers. Networking and community building, though mentioned less frequently, were recognized as essential for fostering collaborations and strengthening the scientific community.

Theme	Key Points
Access to research data and results (9 times)	- Provide exclusive and early access to research findings and results - Clear and short explanation of the data and results would be beneficial
Collaboration opportunities (6 times)	- Exchange experiences and knowledge – Provide researchers' contacts
Networking and community building (3 times)	- Collaboration opportunities and networking

Table 18. Analysis of the answers to Q9: What value proposition can we offer to the scientific experts visiting the MuSP?

In terms of the value proposition for **investors and businesses (Q10)**, networking and partnerships were identified as the most significant offerings, with 11 mentions. Respondents suggested that the MuSP facilitate connections with key industry players, potential partners, and collaborators. Showcasing technologies and providing visibility for businesses and investors was also considered crucial, with 7 mentions. Participants recommended using the platform to organize online events, position it as a marketplace for climate adaptation innovations, and offer a catalogue of potential solutions and investment opportunities. Economic opportunities and the advancement of technology readiness levels (TRL) were also noted as important, with respondents highlighting the need for matchmaking services and insights that could enhance the return on investment.

Theme	Key Points
Networking and partnerships (11 times)	- Facilitate networking opportunities with key industry players, potential partners, and collaborators.
Technology showcase and visibility for businesses and investors (7 times)	- Showcase technologies and market products of the project with high TRL, so that investors and businesses can invest in them - Knowledge of the innovations that are out there and the possibility to connect to interesting parties. - Provide a catalogue of potential solutions and investment opportunities - Use the MuSP to organize online events - Position the MuSP as a marketplace to show the latest innovations on climate adaptation. - Have the MuSP as a platform to provide visibility to companies
Economic opportunities and TRL increase (6 times)	- Establish matchmaking between agents to ensure having economic opportunities to increase the TRL of the solutions. – Receive insight that can be valuable to the implementation of results. – Help investors to ensure the return on investment, the access to advanced technologies and solutions, the support for technology readiness level advancement, regulatory and policy insights. - Investors will be able to see and adopt innovative solutions but also to show their products. – Provide clear information about the relevance to mitigate risks on investments due to climate adaptation measures.

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Table 19. Analysis of the answers to Q10: What value proposition can we offer to the investors / businesses visiting the MuSP?

For **technology providers** (**Q11**), collaboration and partnership building with IMPETUS partners were identified as the primary value proposition, mentioned 15 times. Respondents emphasized the importance of networking with industry players, potential partners, and collaborators to advance technology solutions. Commercialization pathways, along with validation and testing opportunities, were also considered key, with 11 mentions. Participants suggested that the MuSP facilitate matchmaking to enable real-world testing and the development of innovative solutions. Additionally, the visibility of innovative solutions was highlighted as essential, ensuring that technology providers can find opportunities to replicate successful models and extract valuable lessons.

Theme	Key Points
Collaboration and partnerships building with IMPETUS partners (15 times)	- Facilitate networking opportunities with key industry players, potential partners, and collaborators.
Commercialization pathways and validation and testing (11 times)	- Matchmaking to facilitate the testing and developing of technology solutions in real-world scenarios
Visibility of innovative solutions (8 times)	- Ensure that technology providers can find different solutions to replicate and extract lessons learnt

Table 20. Analysis of the answers to Q11: What value proposition can we offer to the technology providers visiting the MuSP?

Finally, the value proposition for **policymakers** was explored (**Q12**), with a focus on collaborations and networking with stakeholders such as scientific experts and technology providers. This theme was mentioned 10 times, with respondents underscoring the importance of connecting policymakers with those who can provide regional insights for climate adaptation. Showcasing innovations for replication at local and regional levels was also considered vital, with 9 mentions. Participants recommended offering a catalogue of tools and services that could be implemented by governments and providing input for policy development through white papers. Access to comprehensive data and research, as well as capacity building and training programs, were also recognized as valuable offerings for policymakers.

Theme	Key Points
Collaborations and networking with SHs (e.g., scientific experts) (10 times)	- Ensure that policymakers can be in contact with different SHs (technology providers, scientific experts, etc.) - Networking with peers, stakeholders, and those who can show regional needs for climate adaptation.
Showcasing innovations for replication (9 times)	- Showcasing innovations for replication at local and regional levels. - Catalogue of tools and services for potential government implementation. - Replication potential and input for policies (white papers).
Access to comprehensive data and Research (3 times)	- Access to comprehensive data and research. - Dissemination of emerging solutions.

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Capacity building and training programs (3 times)	- Capacity building and training programs. -Training and community engagement. - Engagement in collaborative decision-making processes. - Provide capacity building/training/awareness raising for citizens to use the platform.

Table 21. Analysis of the answers to Q12 What value proposition can we offer to the policymakers visiting the MuSP?

Regarding **user interactions** on the MuSP (**Q13**), the survey revealed a preference for forums, which was mentioned 14 times (42.42% of respondents). These forums would serve as a space for discussions and knowledge sharing among users. Uploading content was also seen as an important feature, with 13 mentions (39.39%). This would allow users to contribute their data, research, and insights to the platform. Direct messaging was another suggested interaction method, mentioned 10 times (30.30%), providing a means for users to communicate privately and collaborate more effectively.

Some respondents noted the importance of ensuring clear and easy-to-use user experience (UX) and user interface (UI) design. They also emphasized the need for content moderation and data curation to maintain the platform's quality and reliability. Additionally, the inclusion of interactive functionalities was highlighted as necessary, given that there is a key performance indicator (KPI) to track interactions on the platform. Other potential interaction options mentioned by respondents included chat rooms and a Q&A feature, which could further enhance user engagement.

In the final section **(Q14)**, an open question was posed to allow respondents to raise any questions or suggestions they may have. The comments tackled aspects such as who will be responsible for maintaining the platform and covering its costs. Some respondents suggested linking the MuSP with other sister projects or digital tools, including social media platforms, to expand its reach and functionality. The issue of content moderation and data curation was also raised, with concerns about how to manage user-uploaded content. Finally, respondents questioned the distinction between the MuSP and other existing resources such as Resilience Knowledge Boosters (RKBs), suggesting that clear differentiation is needed to avoid confusion among the targeted end-users.

6.2 Final conceptualization

As previously mentioned in the present document, the final concept note was created after the thematic meeting aimed at presenting the aggregated results and insights of the survey distributed among project partners (section 6.1.1).

However, this section explains all the processes that took place to get to such a point. This task has been performed for the requirement that WP6 has regarding a conceptualization of the web-based multi-sided platform and its related business strategy as a first stage of the design process. This feeds the launch of the conceptualized platform that must be coordinated with WP7, as the platform itself is a result of subtask 7.4.3 (Design and launch of IMPETUS multi-sided platform led by EUT).

6.2.1 IMPETUS Platform: definition and objectives

The theoretical concept definition for the IMPETUS Platform arises from the definition of what a multi-sided platform is. This definition states that it is a type of platform that connects two or more distinct groups of users in a manner that facilitates **interactions** between them. They are mainly used as intermediaries so that the users can co-create value for all parties involved.

Also, the starting point of the conceptualization started from the identification of the following main characteristics:

- **Multiple user groups**: it is crucial to target and engage a combination of different participants that have complementary needs and interests.
- **Interactions**: the main purpose of the design of a MuSP is to be the tool that enables interactions between the targeted user groups.

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- **Value creation for both sides**: if complementary needs and interests are well identified and complementary types of user groups are well targeted, the use of the MuSP will result in a win-win situation.
- **Network effects**: the value that the MuSP can create increases further as more users join.

Taking into consideration the above mentioned, the role of the MuSP in this project was defined with the aim to become a **single-entry point for different types of stakeholders interested in the project outcomes** (e.g. innovation tools, technologies, methodologies, etc.). The **architecture** of the platform can be represented and understood in the following Figure 23:

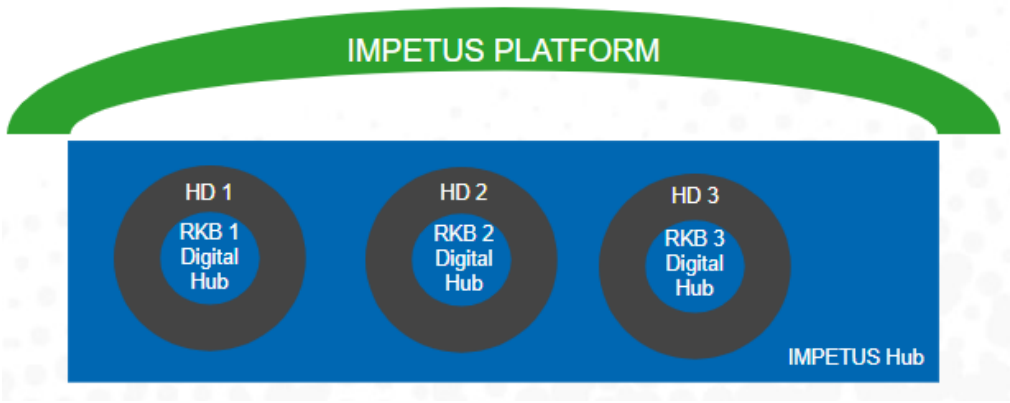

Figure 27: Interrelation between the MuSP and the RKBs

The definitions of the different **elements** shown above are:

- The **RKB 1 Digital Hub** which stands for the 'library' containing all the technical features and project results that are being developed at a regional level in the Demo Site 1.
- The **Human Dimension 1 (HD 1)** that includes the work regarding the identification and stakeholders' engagement (SHE) at a regional level in the Demo Sites.
- The **IMPETUS Hub** englobes two types of elements (Digital Hub & Human Dimension) happening at all the Demo Sites of the project (regional scope). This means that the IMPETUS Hub represents the whole library of these regional 'libraries' (RKB 1 Digital Hub + Human Dimension 1, RKB 2 Digital Hub 2 + Human Dimension 2, etc.) but also contains the project results that have been identified with a wider geographical scope (European, worldwide).

Therefore, the IMPETUS Platform is the **showroom** of the different elements that are part of the IMPETUS Hub. Moreover, given the characteristics of a multi-sided platform, it goes further than being just a library as it allows interactions to happen between the targeted users and stakeholders identified. Also, it is **oriented to make possible further exploitation and business interests** that may arise from the interactions taking place between results owners and potential targeted users and stakeholders.

6.2.2 Classification of potential targeted end-users

The classification of the potential targeted end-users has been influenced by the work done for the user stories in WP2. From this initial list and compared with other MuSPs identified in the benchmark such as NESOI, this is the final list for the IMPETUS Platform in which all agents from the Quintuple Helix Model (QH) are represented:

- Citizens/General public (QH: uniformed or informed citizens, media and culture)
- Scientific experts (QH: Academia)
- Technology providers (QH: Academia / Industry)
- Investors/Businesses (QH: Industry)
- Policymakers (QH: Government)

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From this classification, value propositions for each targeted end-user have been also defined in order to ensure that value added is taken into account for any user that may join the IMPETUS Platform. These value propositions are displayed in the following Figure 27:

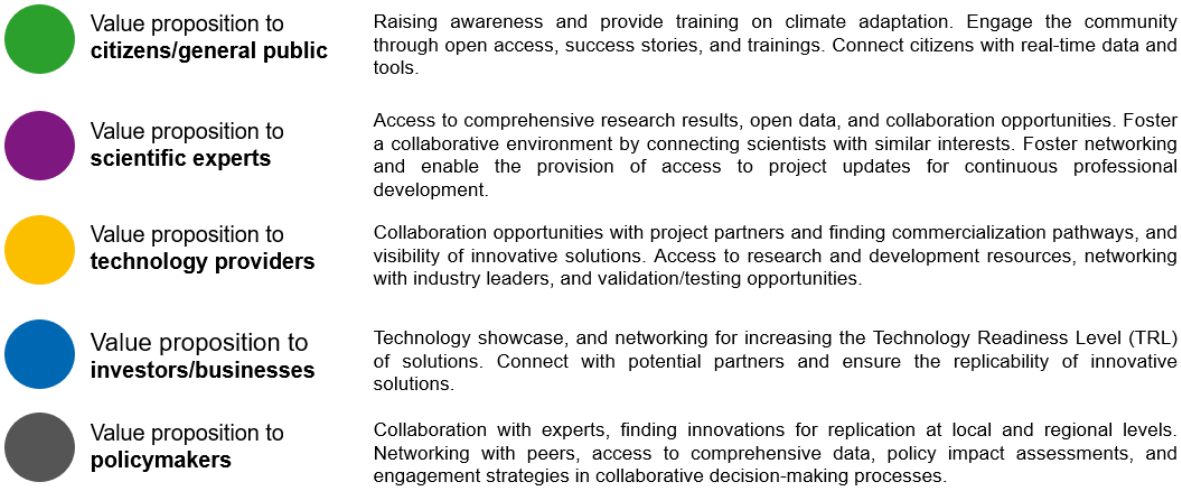

Figure 28: Value proposition per each potential targeted end-user

6.2.3 Functionalities

Regarding the functionalities, the main one is the **search engine (a programmed wizard Software)** that allows **easy navigation** for the different potential targeted users to meet their needs as it will help to display the specific information requested. This navigation can be at a general scope (showroom of the IMPETUS Hub) or it can be more detailed depending on the type of user or other filters that have been considered crucial to make it easier for the user.

The other functionalities are more oriented to the interactions among users, and they will remain at the IMPETUS Platform level with the aim of boosting impact from an interregional perspective. These functionalities have been gathered from the survey distributed among the consortium and they are the following:

- **Calendar of events:** in the platform, a calendar of related events on climate risk hazards will be displayed. This will be completely interactive, as users will be able to upload an upcoming event and, also, material and insights that will be willing to share with the platform members and viewers. This functionality will require the validation of a content moderator in order to ensure consistency among the different events.
- **Repository of materials and documents:** materials and documents of the IMPETUS project can be found in the platform but besides this, the platform will allow users to upload content. This last will also require the role of a content moderator.
- **Sharing in social media:** for instance, the possibility to share the result in twitter/LinkedIn directly.
- **User support:** a chatbot is considered for such functionality with the aim of enabling potential users to ask questions related to the project results and later, obtaining personalized responses accordingly to their specifications and requirements. This chatbot will be further developed in Deliverable D2.6, under WP2.

6.2.4 Next steps: Business model and User journeys

Having explained the above, the next steps are crucial to meet the expectations for the exploitation task in regard to the IMPETUS Platform. This involves a clear definition of the business model and exploitation strategy for the platform to ensure its long-term sustainability. For that, the value proposition

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of such a platform will be further detailed and presented in the final deliverable D6.9. From one side, the value added that will provide in comparison to similar existing platforms taken from an exhaustive benchmark and, on the other side, the purpose and objectives of the MuSP, RKBs and the project's website, highlighting their complementary aspects. Also, user journeys will be mapped to have all the potential interactions that may arise from the platform functionalities and the different users joining and engaging with the platform. This will be complemented with a detailed description of the different types of users that may contribute to the platform along with their key rights and responsibilities to ensure a well-functioning of the IMPETUS Platform.

7 Next steps and conclusions

This deliverable D6.8 constitutes the second Adaptive Exploitation Plan. Its objective is to set the strategic guidelines for exploitation that will be followed during the project, with the aim of collecting all the partners' inputs and intentions to build a solid exploitation strategy.

To this purpose it contains methodology, strategy and tools to develop both the partners individual's exploitation plans and the joint exploitation plans for the shared results. Specifically, the deliverable provides:

- *New Exploitable Results (ERs) or modification to the ones included in D6.3*
- *Prioritization criteria for ERs*
- *Interrelation with T8.4 Intellectual Property Rights (IPR) Management: acknowledgement of IPR claims and the most suitable collaboration agreements*
- *Deeper characterization of the Key Exploitable Results (KERs) identified for the for-profit partners (business-oriented strategic plans).*
- *Conceptualization of the Resilience Knowledge Boosters (including a governance analysis, the theoretical definition and the templates for strategy development)*
- *Conceptualization of the IMPETUS platform (the web-based multi-sided platform)*

The collection of information, as mentioned before, is possible thanks to the partners contribution and to the use of a living document that compiles all their input. Aspects such as the IPR management protection of results will be updated under T8.4 in the next WP8 deliverables.

Moreover, during the plenary meetings, a special emphasis will be put on the co-creating nature of the **Adaptive Exploitation Plans** and the T6.3 leaders will be at the disposal of partners to ensure that the strategies incorporated in this deliverable overcome potential barriers to exploitation. As the project IMPETUS has a strong societal and environmental component due to the climate emergency and the adaptation mechanisms, the focus on the replicability of the results is outlined, as it aims at creating a broader impact, rather than the project itself.

The final deliverable D6.9 will update all the sections for this document and will mainly tackle the following:

- Final list of Exploitable Results (ERs) of the project
- Business-oriented strategic plans for all the for-profit partners
- The prioritization of the Key Exploitable Results (ERs), both for-profit and non-profit partners
- The elaboration of exploitation plans for the prioritized KERs (besides the selected for the business-oriented strategic plans)
- The final conceptualization of the RKBs (including the governance model chosen and their strategic roadmap)
- The final conceptualization of the IMPETUS Platform (with definitive mock-ups)
- Potentially, exploitation agreements if applicable between partners

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