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BOOSTLOG PROJECT

DELIVERABLE REPORT

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The BOOSTLOG project consortium consists of:

Part. No	Participant organisation name (short name)	Country
1 (Coordinator)	Alliance for Logistics Innovation through Collaboration in Europe, ALICE AISBL (ALICE)	BE
2	STICHTING SMART FREIGHT CENTRE (SFC)	NL
3	FUNDACION ZARAGOZA LOGISTICS CENTER (ZLC)	ES
4	STICHTING TKI LOGISTIEK (TKI Dinalog)	NL
5	HACON INGENIEURGESELLSCHAFT MBH (HACON)	BE
6	INSTITUTE OF COMMUNICATION AND COMPUTER SYSTEMS (ICCS)	GR
7	Vlaams Instituut voor de Logistiek VZW (VIL)	BE
8	FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V. (Fraunhofer)	GE
9	FIT Consulting SRL (FIT)	IT
10	FUNDACION DE LA COMUNIDAD VALENCIANA PARA LA INVESTIGACION, PROMOCION Y ESTUDIOS COMERCIALES DE VALENCIAPORT (VPF)	ES
11	TECHNISCHE UNIVERSITEIT DELFT (TU Delft)	NL
12	EUROPEAN ROAD TRANSPORT TELEMATICSIMPLEMENTATION COORDINATION ORGANISATION - INTELLIGENT TRANSPORT SYSTEMS & SERVICES EUROPE (ERTICO ITS EUR)	BE
13	LINDHOLMEN SCIENCE PARK AKTIEBOLAG (LSP)	SW

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Contents

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EXECUTIVE SUMMARY

EU funded research and innovation (R&I) projects on the logistics sector have played an important role in advancing innovations. However, it is noted that not all project outcomes have been implemented or have delivered the expected impacts. The deliverable has been written based on interviews with stakeholders who were in consortia of EU funded projects on logistics and various discussions from BOOSTLOG events (e.g. BOOSTLOG launch event) and other relevant workshops.

This report has analysed the lifecycle of a R&I project funded by an EU Framework Programme to develop a sound understanding of potential obstacles in each step of the lifecycle (before, during, after project and for the whole cycle), thus proposing appropriate frameworks that can help to remove such obstacles and enable implementations. To create positive frameworks, actions are needed from all types of stakeholders. In this report, three groups of stakeholders who are considered to play key roles in R&I projects are: Funding providers (mainly European Commission, but also including national funding providers), project practitioners, and associations including technology platforms representing various sectors who play a key role in advocating for R&I funding, e.g. ALICE.

Key barriers identified & proposed actions to enable a positive framework are:

Before-project phase:

Key barriers	**Proposed actions to enable positive framework**	**Stakeholders concerned**
Engagement of stakeholders for topic identification and work programme forming is often limited to a small group who are familiar with EU funding but lack of knowledge, skills and ambitions in implementation	Engaging industry partners who are users of innovation from the very beginning of a work programme, e.g. identifying topics	EC; Project practitioners; Companies
Proposal evaluation does not consider implementation possibility;	Requiring business plan in proposal	EC
	Knowledge transferring and developing guidelines for business plan	Project practitioners; Associations
	Exploitation potential should be an important part of evaluation of proposal	EC & Evaluators appointed
Consortium consists of only researchers, project managers and developers; consortium may not	Team members of a proposal should include skills and knowledge in legal and business issues aiming for exploitation	Project practitioners;

have users/customers of innovation	Best practice sharing and capacity building among similar types of stakeholders	Project practitioners; Associations
Logistics innovation implementation often requires competitors working together	Encouraging competitors to be in the same proposal	Project practitioners (particularly companies)
	Demonstrating successful experiences to industry stakeholders	Associations

During-project phase:

Key barriers	**Proposed actions to enable positive framework**	**Stakeholders concerned**
Dissemination activities failed to reach out high-level decision makers in industry and policy making	Engage with high-level industry leaders in the logistics sector, and policy makers for public policy making at dissemination event to raise awareness	Project practitioners (particularly companies or public authorities)
Consortium and funding organisation do not evaluate progress towards implementation during project duration	Evaluate potential impacts and potential implementation throughout the project duration	EC & reviewers appointed

Post-project phase:

Key barriers	**Proposed actions to enable positive framework**	**Stakeholders concerned**
Inadequate evaluation of usage of project outcomes and expected impacts;	Post-project audits to evaluate the expected impacts of projects, creating a learning mechanism in order to strengthen the current approaches to steer towards impact in industry practice;	EC
Project outcomes are not ready for commercial market and further development is needed; lack of funding or financial support to bridge efforts needed to transfer project outcomes to market ready solutions, while this lack of	An innovation fund to support the implementation of publicly funded R&I projects, to help the logistics sector to exploit project outcomes	EC; Associations

funding for the sector has not been a focus of policy making		

Concerning the entire lifecycle:

Key barriers	**Proposed actions to enable positive framework**	**Stakeholders concerned**
Lack of knowledge, skills and ambitions in implementing project outcomes from project practitioners;	Best practice sharing and capacity building among similar types of stakeholders	EC
	Knowledge gained from R&I projects should be included in professional trainings and curricula of higher education	EC; Associations
	Developing guidelines specifically for transferability or scale-up	EC; Associations
Lack of trust among competitors to foster partnership	Consortium with competitors working together should be encouraged	Project practitioners (particularly companies)
	Demonstrating good practices to raise awareness of benefits of such cooperation	

The above sets of barriers and mitigating framework conditions are a result of an analysis of 40 EU Framework research, development and innovation projects, 17 interviews with practitioners and researchers. It is the first systematic inventory of barriers and positive measures to address these barriers, which the industry itself regards as critical. Thereby it is one of the cornerstones for achieving a higher utilization and implementation of EU R&I funding for the logistics sector.

Main recommendations can be summarized as follows:

- Manage knowledge, skills and ambitions throughout the entire R&I project lifecycle, including the post project phase:
  - Business and industry's needs should be taken into account from the very beginning and throughout the project;
  - Consortium members should include developers, implementers with business and legal knowledge and users/customers;
  - Exploitation potential and outlook should be a more important part of the evaluation of proposals;
  - Knowledge gained from R&I projects should be included in professional trainings and curricula of higher education to enable knowledge transfer to current and future generation of workforce.

- Create an innovation fund to support the implementation of publicly funded R&I projects to help the logistics sector to exploit project outcomes.
- Increase transferability of results to facilitate scale-up of project outcomes:
    - Best practice sharing and capacity building among similar types of stakeholders;
    - Guidelines specifically for transferability or scale-up should be developed by R&I projects;
    - Cooperation among various projects, projects from different funding schemes, and different initiatives should be facilitated.
- Perform post-project audits to evaluate the expected impacts of projects, creating a learning mechanism in order to strengthen the current approaches to steer towards impact in industry practice.
- Build trust among competitors for pre-competitive stages of R&I:
    - Competitors joining the same R&I projects should be highly encouraged;
    - Framework for sharing data, physical asset and infrastructure should be encouraged; demonstrating benefits of such framework would help build trust;
    - Dissemination of benefits should reach to a high-level decision making people.

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1 Introduction

EU funded research and innovation projects on the logistics sector have played an important role in advancing innovations, accelerating digitalisation of the sector, reducing emissions and pollution, improving efficiency, and strengthening competitiveness. Such research and innovation projects have also created opportunities for cooperation among various stakeholders, enabled new business models and even created new enterprises. Dissemination and exploitation have always been an important part of research and innovation projects. Not only all project proposals have already included dissemination and exploitation plans but also all projects have to develop an exploitation plan that describes use of results for commercial purposes or in public policymaking.

However, it has been noted that not all project outcomes have been exploited and, eventually, expected societal impacts may not be delivered. As a result, the Commission's evaluation report for Framework Programmes was "limited usefulness to policy-makers, stakeholders, or even the Commission itself."[1] It appeared as if it had become an acceptable result that, when projects have concluded, all materials produced by the projects would be archived with very limited usage beyond the project ending. To address this issue, the European Commission has requested that all ongoing Horizon 2020 projects should plan their dissemination and exploitation activities beyond EU funding ending. Following finishing of HORIZON2020 programs (2014 – 2020), Horizon Results Platform[2] and Horizon Results Boosters[3] services have been set up, dedicated to exploitation of HORIZON2020 projects. There are also Horizon Impact Awards to acknowledge impacts of HORIZON2020 projects on society. In addition, various support schemes are available for follow-up steps, e.g. national programmes, InnovFin[4], EFSI[5], Regional Funds, Enterprise Europe Network (EEN), European Intellectual Property (IP) Helpdesk[6], European exploitation support schemes.

Regarding the logistics sector, although it often engages a wide range of stakeholders, implementation can be highly complex and time-consuming. However, as logistics is one of the fastest growing sectors with many challenges, the sector is eager for innovative solutions and there have been many successful examples and lessons learnt from exploitation of R&I project outcomes. The sector intends to capitalize on this situation and make the outcomes of R&I projects known and used more broadly.

This report has looked into past projects and their results and impacts, thus identifying successful cases and lessons learnt. Lifecycle of EU funded projects has been analysed to identify barriers in different phases (i.e. before, during and post project) that have prevented implementation. Successful experiences from implementation cases of R&I projects have been used to form proposed conditions that will enable implementations of R&I outcomes, thus delivering expected impacts. Roles of all types of stakeholders (e.g. funding providers, project practitioners, and relevant associations) in the different phases of R&I projects have

[1] "FP7: bigger and better, but will it be value for money?", Nuala Moran, Science|Business, 2009

[2] Horizon 2020 Results Platform - Making Result Matter: https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/horizon-results-platform

[3] https://www.horizonresultsbooster.eu/

[4] InnovFin: EU finance for innovators: https://ec.europa.eu/programmes/horizon2020/en/h2020-section/access-risk-finance

[5] Enterprise Europe Network (EEN): https://een.ec.europa.eu/

[6] European Intellectual Property (IP) helpdesk: https://intellectual-property-helpdesk.ec.europa.eu/regional-helpdesks/european-ip-helpdesk_en

been analysed and actions they could take in the different phases to advance implantations have been recommended.

This report is organised as:

- Chapter 2 describes the methodology and information collected to identify barriers and propose positive framework conditions including analysing lifecycle of EU funded R&I project;
- Chapter 3 describes in the before-project phase potential barriers identified and how to address them;
- Chapter 4 describes in the during-project phase potential barriers identified and how to address them;
- Chapter 5 describes in the post-project phases potential barriers identified and how to address them;
- Chapter 6 describes barriers considering the entire lifecycle of R&I projects and general positive framework conditions for higher impacts;
- Chapter 7 provides summary of barriers and positive framework conditions and conclusions

2 Methodology, information gathering and analysis

Barriers identified and positive framework proposed in this report are based on in-house knowledge, analysis of past projects, various interviews with practitioners and discussions from various events organised. The authors and many stakeholders engaged (e.g. expert interviewed) have extensive experiences with EU funded projects and have actively participated in all phases of R&I projects.

2.1 Inputs collected from Cloud Report

The BOOSTLOG consortium has mapped R&I projects funded by various Framework Programmes, e.g. FP5 (1998-2002), FP6 (2002-2006), FP7 (2007-2013), and the ongoing HORIZON 2020 (2014 – 2020). R&I projects funded by those Framework Programmes covering a wide range of sub-topics in the logistics sector have been presented in a BOOSTLOG deliverable, D2.1 Detailed Mapping of EU funded R&I Projects[7]. BOOSTLOG WP2 is developing 8 'Cloud' reports. Each cloud report covering a specific sub topic of logistics studies R&I projects on this sub topic, efforts made into R&I, and impacts of R&I. Developing each cloud report started with mapping EU funded R&I projects related to this sub topic, then identifying potential implementation cases through web-based research and interviewing with project consortium members. Implementation cases are validated by experts through an expert workshop. Developing such reports is helping in developing a sound understanding of factors that have influenced on implementations of R&I projects, thus forming inputs to this report. Methodology of developing cloud report is shown in Annex.

Currently two cloud reports have been developed:

- Logistics Coordination and Collaboration (D2.2 Cloud Report on Logistics Coordination and Collaboration)
- Urban logistics (D2.4 Cloud Report on Urban Logistics);

The two cloud reports present two types of implementations, i.e. from project outcomes to

- Commercial products or services /new start-ups

[7] All BOOSTLOG deliverables once submitted are available at the BOOSTLOG webpage: https://www.etp-logistics.eu/boostlog/

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- New policy instruments for cities or regional governments

For Logistics Coordination and Collaboration, 19 projects from FP5, FP7 and HORIZON2020 have been selected for analysis as shown below:

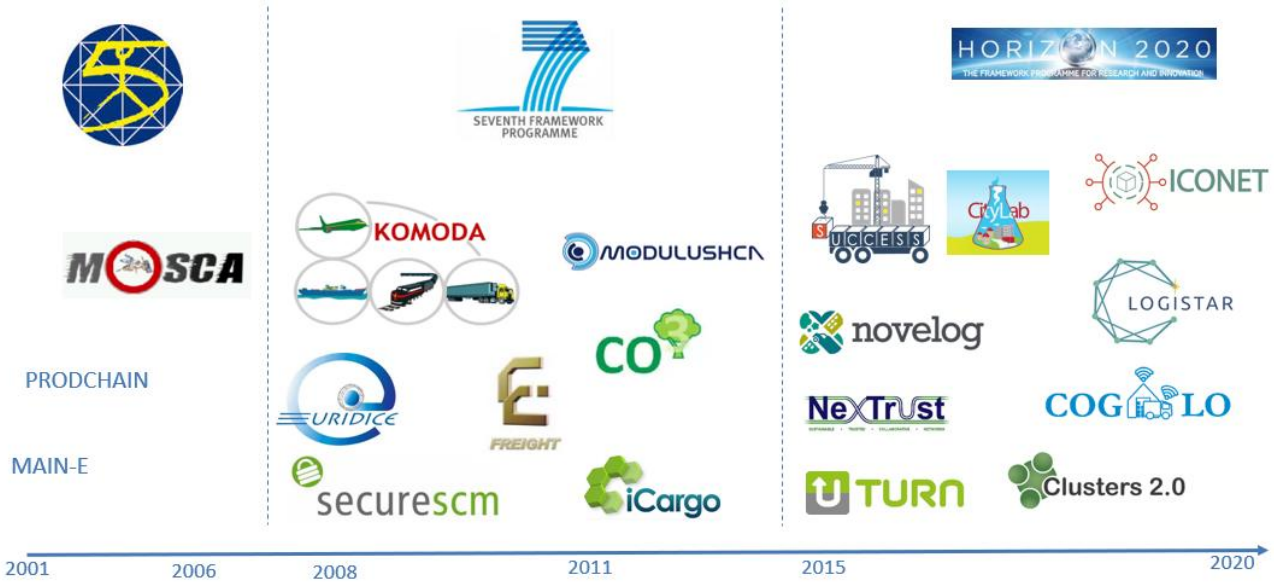

Figure 1. Past projects on Logistics Coordination and Collaboration

For Urban logistics, 21 projects from FP5, FP6, FP7 and Horizon 2020 have been analysed:

Figure 2. Past projects on Urban Logistics

Note that some projects may be included in both cloud reports as they cover both sub topics.

Authors of each cloud report have conducted semi-structured interviews to practitioners who have participated in those R&I projects identified. Many of practitioners have made significant efforts to advance market uptake of outcomes of their projects, thus delivering concrete impacts on the logistics sector. For the cloud report on logistics coordination and collaboration, 9 interviews were conducted; for the cloud report on Urban Logistics, 8 interviews were conducted.

Each cloud report identifies barriers to successful implementation of R&I project outcomes specifically for its sub topic. Based on such barriers identified, this deliverable aims to summarise the barriers to successful implementations for all the projects in the logistics sector and proposes positive frameworks that can advance exploitation of public funded R&I projects, thus boosting impacts of R&I investments on the whole logistics sector. While all barriers identified and corresponding positive framework conditions proposed are specific for the logistics sector, some may be applied to the whole transport sector or even beyond.

2.2 Inputs collected from BOOSTLOG Events

The BOOSTLOG consortium has organised three events:

- BOOSTLOG launch event[8], 24th March 2021
- BOOSTLOG WP4 Workshop on Identifying R&I priorities in logistics[9], 26th October 2021
- BOOSTLOG Coordination and Collaboration Cloud Report Launch Event[10], 24th November 2021

Each of the events has been participated by various stakeholders. In BOOSTLOG, four types of stakeholders are considered:

- Company;
- R&I;
- Government;
- Others (including civil society and associations)

Detailed information about stakeholder engagement for the BOOSTLOG project can be found in D5.1 Plan for Stakeholder engagement, communication and dissemination.

Percentages of each type of stakeholders in the three BOOSTLOG events are shown below:

Table 1 Percentages of all types of stakeholders in BOOSTLOG events

Event	Participants	Company (%)	R&I (%)	Government (%)	Others (%)
Launch Event	130	55%	20%	11%	14%
WP4 workshop	108	45%	31%	8%	16%
Cloud report launch event	56	61%	9%	10%	20%

[8] Detailed information about the event can be found: https://www.etp-logistics.eu/boostlog-launch-event-boosting-the-impact-of-freight-transport-and-logistics-eu-funded-research-supporting-competitiveness-and-addressing-the-climate-challenge/

[9] Detailed information about the event can be found: https://www.etp-logistics.eu/online-workshop-on-identifying-ri-priorities-in-logistics-1000-1200-26th-oct-2021/

[10] Detailed information about the event can be found: https://www.etp-logistics.eu/first-alice-logistics-innovation-award-launch-of-the-cloud-report-on-coordination-and-collaboration/

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2.3 Lifecycle analysis of EU funded R&I projects for barrier identification

It is expected that only some R&I project outcomes will be implemented and deliver real impacts after the end of the projects. Implementation of R&I project outcomes may take very long time but it is noted that even after several years, some project outcomes were still not implemented, and had been long forgotten. The lifecycle of a R&I project has been analysed to understand factors in each phase that may influence the implementation of the project outcome. Three phases are considered: before project, during project and post project. In each phase, several steps are considered. Each of the steps will have impact on future implementation. Only if a topic for a call for proposal would address market needs or meet policy makers' interests, the project outcomes would likely be implemented. If a project consortium does not include stakeholders who are willing and capable to implement project outcomes, the implementation of this outcomes by the consortium is also unlikely.

The phases and the different steps of the lifecycle of EU funded projects by an EU Framework Programme is illustrated as follows:

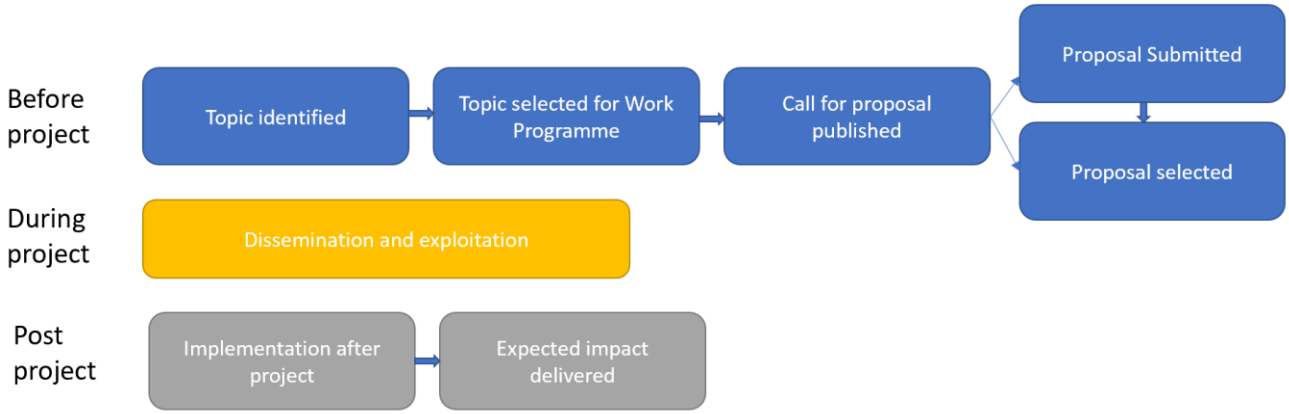

Figure 3. Steps of a lifecycle of a R&I project funded by an EU Framework Programme

To ensure tangible and expected impacts delivered after the end of a project, at each step funding providers (policy makers) and project practitioners (either from company, R&I, member state governments, or associations) should carefully consider whether or not their actions will help future implementation.

Before project:

The first step for EU funding is to identify topics resulting from the input from a variety of stakeholders, which then undergo a selection process by the European Commission. Selected topics become part of a work programme that includes detailed descriptions of topics, types of projects and expected impacts. When the work programme, e.g. call for proposal, is published, project practitioners will form consortia and develop proposals for the call. Evaluation of submitted proposals are done by a group of experts appointed and coordinated by funding providers (e.g. EC). To ensure that the proposal selected will lead to future implementation and deliver expected impacts, efforts from both funding providers and stakeholders are required.

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Table 2 Questions to be answered before a R&I project and action required

Step	**Key questions**	**Action for different stakeholders**	
		Funding provider/ policy makers	**Partitioners who are interested in EU R&I projects**
Topic identified	*Does the topic of the work program match priorities of industry and society? How to define R&I priorities?*	- Ensure that appropriate stakeholders have been consulted.	- Provide inputs and advocate for topics that are important
Topic selected for Work Programme	Does the identified topic address priorities (policy and industry needs)?	- Ensure that the identified topics will address priorities (policy and industry needs)	
Call for proposal published	*Is appropriate call for proposal published?*	- Ensure that the call proposal has included requirements leading to implementation and impact delivery	
Proposal submitted	*Is appropriate proposal developed?*		- Form a consortium including the stakeholders needed for implementation; - Develop the proposal with ambitious and an appropriate exploitation plan
Proposal selected	*Is appropriate proposal selected?*	- Evaluate proposals that will lead to implementation, e.g. if the consortium members have the capability and ambition to implement, if the exploitation plan is executable, etc.	

During project

Each EU funded project carries out extensive activities on dissemination and exploitation. However, as not so many projects have resulted in successful implementation, the current practices on dissemination and exploitation may not be effective. To ensure that the project dissemination and exploitation lead to future implementation, the project officer (and appointed reviewers) may evaluate the project activities and guide the projects towards future implementation, while consortium should design and carry out their activities for the same objective.

Table 3 Questions to be answered during a R&I project and actions required

Step	**Key questions**	**Action for different stakeholders**		
		Funding provider/ policy makers/ reviewers	**Project consortium members**	**Other practitioners outside the consortium**
Dissemination and exploitation during project	*Are the project dissemination effective for implementation?*	- Select reviewers who have experiences in implementation - Evaluate the project dissemination based on potential implementation	- Design and carry out a dissemination plan to engage potential partners for future implementation	- Follow the project development to consider any outcomes that can be implemented - Provide feedback when needed - Form partnership with project consortium
	Are the project exploitation plan ready for implementation?	- Evaluate if the project exploitation activities can advance implementation	- Initiate implementation activities during the project duration	

Post project

Final evaluation of a project will be executed right after the project ends. Currently, project consortia are required to continue the project dissemination and exploitation after the end of a project.

Table 4 Questions to be answered after end of a R&I project and actions required

Step	**Key questions**	**Action for different stakeholders**		
		Funding provider/ policy makers	**Project consortium members**	**Other practitioners outside the consortium**
Implementation after project	*Has any outcome of the project been implemented?*	- Monitor and evaluate if any project outcome is being implemented - Support implementation whenever needed	- Continue efforts to bring project outcomes to market - Advocate for enabling policy framework for implementation	- Analyse and evaluate if project outcomes can address societal challenges or industry' pain-points as: - Do these outcomes meet a market need?

				(economic-driven) - Can implementation deliver positive societal benefit?
Expected impacts delivered	*Has expected impact been delivered?*	- Monitor and evaluate impact delivery - Disseminate successful experiences - Influence future funding (topics and proposal selection)	- Evaluate benefits of participating in the project to the organisation - Summarise lessons learnt to decide what kind of proposal to participate in the future	- Evaluate possibilities of participation in future proposals and projects.

3 Barriers occurring before project and corresponding positive framework conditions

3.1 Identifying topics, forming work programmes for boosting implementation and enhance impacts

Current practice

Although implementing R&I project outcomes and generating impacts are complex, foundation to any successful implementation is that the project outcomes address societal challenges and pain-points of industry. If projects have not developed outcomes needed by society and industry, neither ambition, partnership nor efforts to support implementation can help. Therefore, how to define topics, select priorities and design public funding programmes are essential for ensuring that projects funded deliver results demanded by the society and the logistics sector. For funding providers/policy makers, it is important to not fund consortia who aim to receive funding only without any ambitions beyond the project duration.

EU's work programmes for large R&I funding schemes, e.g. the past programs - FP7 and HORIZON 2020, and ongoing HORIZON Europe, define topics of calls for proposals, type of projects, budget for each call, and expected impacts. European Commission has made significant efforts to engage with a wide range of stakeholders in the process of defining each work program. Taking Work Program 2018 – 2020 of Horizon 2020 as example, "*Preparations for the work programme 2018-2020 began in 2016 with stakeholder consultations and discussions with Member States on priorities, which have been outlined in informal working documents, namely 17 thematic scoping papers and one overarching document. Each thematic section organised the stakeholder consultations in the way that has been best suited to the respective subject and the respective*

target groups. More detailed information on the consultations and the preparation of the current and the past work programmes can be found for the following topics."[11]

For the logistics sector, ALICE, as the European Technology Platform for innovation in the logistics sector, has played an important role in identifying priorities together with other technology platforms such as ERTRAC[12]. Each programme also funds Coordination and Support Actions (CSA) projects that can provide recommendations to topics in various sectors. For example, BOOSTLOG and the STORM are two of ongoing CSA projects[13]. Technology platforms usually identify priorities through their members' working groups, while CSA projects consortia develop recommendations-based surveys (e.g. questionnaires) and workshops that can reach out a wider range of stakeholders.

Barriers and proposed solutions

However, although CSA projects aim to reach out a wider range of stakeholders through their surveys or workshops, the actual participations from various types of stakeholders are unbalanced. In the recent BOOSTLOG survey on identifying R&I priorities in logistics, only 17% of the participants answering the survey were from logistics industry (e.g. port manager, logistics operators, etc) and about 30% of the participants in the survey were from various associations (regional, national or EU level). This result is not surprising as such associations often have specific mandates from their members to influence work programmes. It has been well recognised that the participation of industry in the Framework Programme is declining. It fell from 39% in FP4 to only 25% in FP7[14]. One reason to explain such decline is the excessive administrative burdens to participating in EU funded projects and the long period from topics definition to project starting. The decline may be somewhat overstated, because some of the industry participation is expected to come through Joint Undertakings or other schemes. However, industry may feel that their needs have not been sufficiently reflected in the topic definitions, selection of topics and design of work programmes.

Organisations and people who work on EU funded R&I projects are often limited to a relatively small group. Administrative burdens, requests for unique skills of proposal writing and project management skills, and closed networks (often through associations) prevent new comers from new organisations and new people. This leads to a less-than-ideal situation, i.e. the same group of people to design programmes, evaluate proposals and participate in projects. Their goals often focus on future funding with limited interests or ambitions to bring R&I project outcomes into markets and the access is limited to those who are interested in reaping the fruits of R&I for commercial or societal benefit.

A more open approach therefore is needed to ensure that users of innovation (i.e. who will be likely to implement R&I project outcomes) will have their say in identifying topics and forming programmes. Not only companies (e.g. logistics operators, port manager, warehouse owner and manager etc) should be involved in this process, business decision makers of such companies (beyond EU project managers or developers) should be involved.

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[11] What is work programme, available at https://ec.europa.eu/programmes/horizon2020/en/what-work-programme

[12] the European Road Transport Research Advisory Council, available at https://www.ertrac.org/

[13] The STORM project, available at https://project-storm.eu/

[14] Interim Evaluation of the Seventh Framework Programme - Report of the Expert Group, 2010. Available at https://www.kowi.de/Portaldata/2/Resources/fp7/fp7_interim_evaluation_expert_group_report_2.pdf

3.2 Designing call for proposals and selecting right proposals for higher impacts

Current practice

Currently a call for proposal defines the topic, type of project, expected outcomes and scope. It often requires that a proposal involves specific types of stakeholders. For example, the past Horizon Europe Call for HORIZON-CL5-2021-D6-01-08: New delivery methods and business/operating models specifies: *'Actions should focus on piloting cooperation with private logistics operators, local businesses and establish new models for addressing governance and management of logistics operations in urban and peri-urban areas'.* Dissemination and exploitation plan is an important part of any proposal. However, such plan is about how to engage stakeholders, organise events, publications etc.

Barriers and how to address

It is clear that the current calls for proposals have been designed with intention of implementation of further outcomes. However, a proposal is often developed by project managers from R&I associations, and project managers and developers from companies. As they often have no experience or knowledge in implementation, a successful proposal is for winning funding rather than leading to implementation.

Implementation of R&I outcomes require special conditions, according to an expert who has successfully further developed R&I project results into commercial services, three key elements were identified:

I. Demanding Customer
II. Capable R&D Expertise
III. Provider willing to commercialise

Based on the three elements, two essential requirements for R&I projects aiming for implementation are:

- Consortium members with ambitions for implementation;
- Consortium members who include demanding customers or can reach out potential customers;

Calls for proposals should then request consortia consisting of partners who demonstrate ambition to bring innovation to exploitation and experience in exploitation. Currently, relevant experiences indicated in proposals focus on experience in past projects rather than implementation of project outcomes. If a consortium would consist of experienced partners who have done many projects without demonstrating any implementations, the consortium should not be selected.

If a proposal would require an exploitation plan aiming to implementation or business plan, guidelines for developing exploitation plan, business plan, and forming consortium etc., should be developed based on good practices.

In addition, implementation of innovation in the logistics sector often concerns legal and business issues. A project proposal should define exploitation tasks concerning legal and business issues. Such tasks should be performed by consortium members with legal and business knowledge. In the "Recommendations towards a better take-up of innovations from European research" from IMIS15 project, regarding funding programmes, three recommendations have been identified:

- *Require business plans at proposal stage;*

[15] Towards a single and innovative European transport system: Implementation of multimodal innovative solutions ("IMIS"), 2019

- *Improve project monitoring processes;*
- *Enforce mechanisms support innovation uptake & market penetration*

While requiring business plans, corresponding experiences and skills of consortium members and staff of project teams should be required. Such contents in a proposal should be given more attention during project evaluation under a category of 'exploitation potential'. This may prevent '*a well written proposal but otherwise fruitless*'.

3.3 Developing proposals aiming for implementation and higher impacts

Current practice

The usual situation is a consortium consisting of partners who are very experienced in public funded projects, and can deliver excellent project proposals. However, business models behind such consortium members may be 'gaining public funding' rather than 'using public funding to develop innovation for business'.

Although some project consortia consist of companies with the potential to bring project outcomes to the market, it is often that only researchers or project managers in such companies who have no experience or ambition on implementation shape the consortia. Participation in EU funded projects may not reach to high level management of a company, thus outcomes may not be considered in the company's future strategy.

Barriers and how to address

Forming an appropriate consortium is key to future successful implementation. A consortium should not only include partners needed for future implementation but also appropriate personnel from all partners. Business personnel should be included at proposal preparation to provide their views on future implementation possibilities. As implementing innovation in the logistics sector often concerns legal issues, personnel with legal knowledge should also be consulted. Each partner should develop internal exploitation plan to be engaged at different stage of projects to ensure that project developments serve companies' business strategy.

One specific challenge faced by the logistics sector in the field of coordination and collaboration is that innovative solutions often require competitors to cooperate. Therefore, a project consortium shaped with competitors should be highly encouraged.

4 Barriers occurring during project and corresponding positive framework conditions

Current practice

During a project period, the project consortium develops a dissemination and exploitation plan supported by a series of communication materials (logo, brochures, press release) and channels (website, social media). Dissemination activities often include project events, presentations at conferences, publications at professional magazines or academic journals.

Project review will be carried out during project period (normally in half way of the project) and right after end of the project. Project review is still largely based on checking quality of deliverables and whether or not KPIs are met.

Neither funding organisation nor project consortium members sufficiently evaluate impacts of their project during the project period and understand whether or not investments in R&I have values for organisations and society.

Barriers and how to address

Project dissemination events are often participated by other project consortia or project partitioners. Such events and dissemination activities may not be sufficient to raise awareness among high-level decision makers about innovative solutions developed by the projects.

Dissemination therefore may aim to engage high-level decision making in industry and policy making who can move forward implementation. For example, one of the ALICE Innovation Award selection committee members indicated that although the implementation of Logistics Coordination and Collaboration solutions can significantly reduce emissions it however has rarely reached out high-level business decision makers. Speeches or presentations from such decision makers would advance implementation. However, this is somehow missing. Dissemination and exploitation plan should aim to involve high level business leaders who can help implementation inside an organisation or raise awareness to other stakeholders.

This will also apply for logistics projects aiming at developing enabling policy frameworks (e.g. urban logistics projects). For public policy making, it is important to engage policy makers and regulatory bodies for dissemination. It is noted that although local authorities often participate in an EU funded R&I project, staff from local authorities often are 'EU funding manager' who may not have sufficient influence on policy making at higher level, creating barriers to implement project outcomes in public policy making. This can be overcome by inviting high level policy makers to participating in project events or dissemination activities to draw attention.

5 Barriers occurring post project and corresponding positive condition frameworks

Current practices

When a project comes to its end, the project consortium has obligation to continue its dissemination and exploitation. However, there is no evaluation mechanism to monitor the impact of the project. Evaluation of the project will also occur once right after all the deliverables are submitted. Post project auditing is only for financial reporting, i.e. to check whether or not funding has been spent according to rules.

Bridge the Gap in TRL

It is noted that project outcomes, even after piloting or living lab phases, rarely are ready for commercial market, i.e. reaching beyond Technology Readiness Level (TRL) 4 -5. It is not just scaling but also about continuing the development until companies can adopt a proven design. An innovation fund could be instrumental to bridge the gap. The gap is colloquially referred to as the technological "valley of death" to emphasize that many new technologies reach TRLs 4–6 and die there.

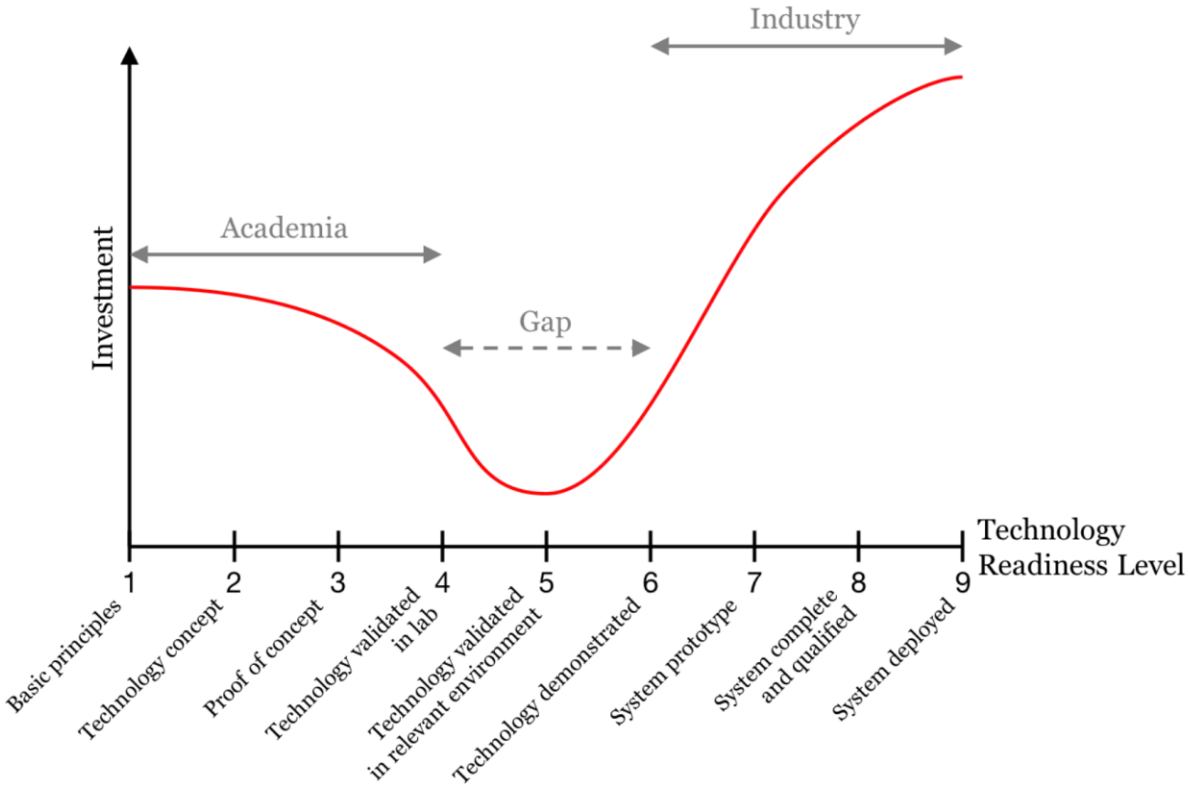

Figure 4. The TRL and "Valley of Death" (Alessandro Rossini, "Five actions for academia and industry to co-create innovation"[16])

As mentioned in Chapter 1 Introduction, there are many schemes that have been designed to support post project implementation such as national programmes, InnovFin, EFSI, Regional Funds, Enterprise Europe Network (EEN) etc. Funding is probably much needed to bridge the gap from project outcomes to commercial products/solutions. EU has set the first Innovation Fund for large-scale projects that specifically aims to bring breakthrough technologies to the market in energy-intensive industries, hydrogen, carbon capture, use and storage, and renewable energy. The concept of the Innovation Fund is shown below. The Innovation Fund aims to bring technologies developed within the framework of Horizon 2020 to market roll out by covering costs of pilot, demonstration and scale-up. It bridges the gap left currently between Horizon 2020 and

[16]Available at: https://www.pwc.no/en/bridging-the-technological-valley-of-death.html.

InvestEU[17] and Connecting Europe Facility (CEF).[18] The current Innovation Fund is dedicated to energy transition and it is not suitable for the logistics sector, even though the logistics sector urgently needs innovation to decarbonise the sector.

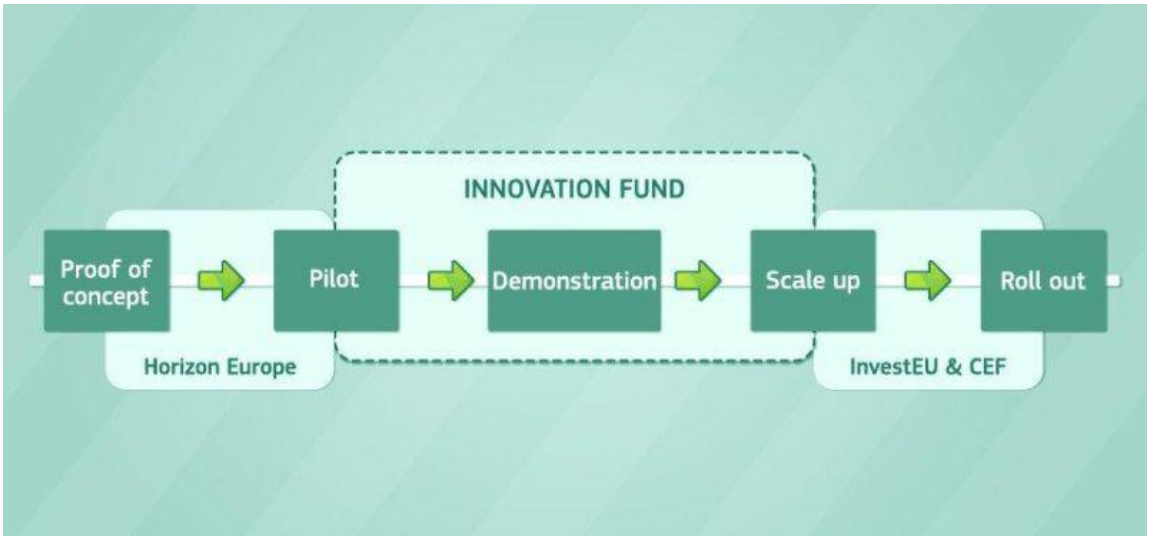

Figure 5. The concept of Innovation Fund (picture from social media post of Ursula von der Leyen, the president of European Commission[19])

Yet there is no such funding available to support innovation in the logistics sector, a significant investment in R&I have been made in the sector. It is estimated that about €1000 million and 160 -200 projects in logistics were funded according to the BOOSTLOG mapping[20]. Setting up innovation fund dedicated to implement public funded R&I projects to help the logistics sector to exploit project outcomes is therefore recommended for EC and/or for regional and national funding schemes. Evaluation of proposals for such funding scheme should invite experts from business and industry, and ideally whose who are normally unfamiliar with EU funding to bring insights into potential projects.

Traditional players of the logistics sector are less keen to innovation, and even less keen to cooperation. In the logistics sector, cooperation among competitors often is the only way to scale up an innovation. Creating a common framework for sharing data, physical assets and infrastructure would help to facilitate cooperation, thus advancing implementation of innovation. For the logistics sector, innovative solutions have been developed but often not being implemented or only at smaller scale. Innovation Fund for the logistics sector can help to bring competitors together and create such a common framework, thus demonstrating tangible benefits of innovation. Dissemination of benefits of such a common framework would help build trust not only

[17] https://europa.eu/investeu/home_en

[18] https://ec.europa.eu/inea/en/connecting-europe-facility

[19] https://www.linkedin.com/feed/update/urn:li:activity:6866336952019501056?updateEntityUrn=urn%3Ali%3Afs_feedUpdate%3A%28V2%2Curn%3Ali%3Aactivity%3A6866336952019501056%29

[20] https://www.etp-logistics.eu/wp-content/uploads/2021/10/BOOSTLOG-Presentation.pdf

for project partners but also for other stakeholders of the sector. Again, dissemination of benefits should reach out to a higher level of decision makers.

Evaluate impacts after project closure

A key barrier to implementation is poor impact evaluation of research efforts. During each project, significant efforts of dissemination and communication are made already. However, such efforts have limitations, as expected impacts of innovations cannot be seen or properly demonstrated during the project duration. As long as projects are evaluated only during the project duration or right after the end of the project, proposed exploitation actions, or expected impacts of a project cannot be observed with real life data or information. Currently there is no consequence for project consortium members whether or not they make any efforts in exploitation after the project ending. Also, the project's evaluation does not take into account whether any exploitation occurs at all. This hampers the learning process within the innovation community about possible success factors.

To encourage implementation and boost impacts, the EC should consider to build an evaluation mechanism to understand impacts of a funded project, several years after the project ending. A similar approach to audit of financial reporting may be considered, aiming to developing a sound understanding of value of investment into R&I. Evaluate or audit whether or not expected impacts of a project have been reached and understanding efforts of project consortium in implementation of project results could serve as a reference to future funding. For example, if an organisation has always proposed exploitation actions but never took any or has not achieved success, the organisation may be flagged as a weak exploitation partner. At the same time, those who have successfully implemented project outcomes should be recognised and awarded. ALICE Innovation Awards have served the purpose but EC or other funding bodies should take into consideration of their success for future funding. Irrespective of the incentive structures applied, better evaluation will also create a new learning mechanism about the necessary conditions for projects that eventually result in successful implementations.

6 Consider the entire lifecycle of a R&I project

Skills and knowledge transfer

Lack of skills in innovation implementation may be addressed by additional funding or specific projects that provide training to current practitioners and educations to future workforce. The BOOSTLOG project initiated to summarise successful experiences in exploitation and attempt to bring such success under spotlight by issue ALICE Innovation Award. However, such efforts are still limited. How to transfer knowledge and experiences gained in implementing R&I project outcomes has not been sufficiently addressed and more efforts would be needed. It is particularly important to facilitate successful experiences from the implementation cases identified by the BOOSTLOG Cloud Reports to all R&I researchers and project participants in the logistics sector.

Business and exploitation plan

Guidelines for developing exploitation plan and business plan for a R&I project should be developed based on good practices. Such guidelines will assist proposals' participants to develop a project that not only aims to

win funding but also lead to successful exploitation, thus avoiding funding '*a well written but otherwise fruitless*' proposal.

Engaging customers

It is extremely important to engage potential users or future customers of innovation at all steps of R&I projects from identifying topics, forming work programmes, evaluating proposals to reviewing projects. It would also be beneficial to have them in the consortium. Thus, the consortium will be able to run pilots or living lab during the project duration with users and customers.

Dissemination focusing on benefits

There is overall reluctance to be involved in implementation of project outcomes due to lack of potential benefits. Dissemination of a project should focus on messages to the sector on potential benefits. Evaluation task of a project should deliver evidences that can support such dissemination. Framework for sharing data, physical asset and infrastructure should be encouraged. Demonstrating benefits of such framework would help build trust that enable cooperation among competitors.

7 Summary, conclusions and the way forward

Use of EU R&I project results in practice relies not just on capabilities and willingness of the industry to take up results and convert them into business. It also relies on framework conditions which are under the influence of governments and the EU-subsidized R&I projects themselves. This report has made an inventory of the main barriers to uptake of R&I project results and calls for more attention to specific framework conditions.

Before project phase:

- **Barrier**: Engagement of stakeholders for topic identification and work programme forming is often limited to a small group who are familiar with EU funding but lack of knowledge, skills and ambitions in implementation;
  - **Propose**: Engaging industry partners who are users of innovation from the very beginning of a work programme, e.g. identifying topics;
- **Barrier**: Proposal evaluation does not consider implementation possibility;
  - **Propose**: Requiring business plan in proposal;
  - **Propose**: Facilitating knowledge transferring and developing guidelines for business plan;
  - **Propose**: Exploitation potential should be an important part of evaluation of proposal;
- **Barrier**: Consortium consists of only researchers, project managers and developers; consortium may not have users/customers of innovation;
  - **Propose:** Team members of a proposal should include skills and knowledge in legal and business issues aiming for exploitation;
  - **Propose:** Best practice sharing and capacity building among similar types of stakeholders;
- **Barrier**: Logistics innovation implementation often requires competitors working together;
  - **Propose:** Encouraging competitors to be in the same proposal;
  - **Propose:** Demonstrating successful experiences to industry stakeholders;

During project phase:

- **Barrier**: Dissemination activities failed to reach out high-level decision makers in industry and policy making;
  - **Propose**: Engage with high-level industry leaders in the logistics sector, and policy makers for public policy making at dissemination event to raise awareness;
- **Barrier**: Consortium and funding organisation do not evaluate progress towards implementation during project duration;
  - **Propose**: Evaluate potential impacts and potential implementation throughout the project duration.

Post project phase:

- **Barrier**: Inadequate evaluation of usage of project outcomes and expected impacts;
  - **Propose**: Post-project audits to evaluate the expected impacts of projects, creating of a learning mechanism in order to strengthen the current approaches to steer towards impact in industry practice;
- **Barrier**: Project outcomes are not ready for commercial market and further development is needed; lack of funding or financial support to bridge efforts needed to transfer project outcomes to market ready solutions, while this lack of funding for the sector has not been a focus of policy making
  - **Propose**: An innovation fund to support the implementation of publicly funded R&I projects, to help the logistics sector to exploit project outcomes.

Concerning the entire lifecycle:

- **Barrier**: Lack of knowledge, skills and ambitions in implementing project outcomes from project practitioners;
  - **Propose**: Best practice sharing and capacity building among similar types of stakeholders;
  - **Propose**: Knowledge gained from R&I projects should be included in professional trainings and curricula of higher education;
  - **Propose**: Developing guidelines specifically for transferability or scale-up;
- **Barrier**: Lack of trust among competitors to foster partnership;
  - **Propose**: Consortium with competitors working together should be encouraged;
  - **Propose**: Demonstrating good practices to raise awareness of benefits of such cooperation.

Main recommendations can be summarized as follows:

- Manage knowledge, skills and ambitions throughout the entire R&I project lifecycle, including the post project phase:
  - Business and industry's needs should be taken into account from the very beginning and throughout the project;
  - Consortium members should include developers, implementers with business and legal knowledge and users/customers;
  - Exploitation potential and outlook should be a more important part of the evaluation of proposals;

    - Knowledge gained from R&I projects should be included in professional trainings and curricula of higher education to enable knowledge transfer to current and future generation of workforce.
- Create an innovation fund to support the implementation of publicly funded R&I projects to help the logistics sector to exploit project outcomes.
- Increase transferability of results to facilitate scale-up of project outcomes:
    - Best practice sharing and capacity building among similar types of stakeholders;
    - Guidelines specifically for transferability or scale-up should be developed by R&I projects;
    - Cooperation among various projects, projects from different funding schemes, and different initiatives should be facilitated.
- Perform post-project audits to evaluate the expected impacts of projects, creating a learning mechanism in order to strengthen the current approaches to steer towards impact in industry practice.
- Build trust among competitors for pre-competitive stages of R&I:
    - Competitors joining the same R&I projects should be highly encouraged;
    - Framework for sharing data, physical asset and infrastructure should be encouraged; demonstrating benefits of such framework would help build trust;
    - Dissemination of benefits should reach to a high-level decision making people.

The BOOSTLOG project has been working and will continue working on creating positive framework conditions including:

- Collecting implementation cases (as best practices) and developing a comprehensive understanding of factors enabling successful implementation through 'Cloud Reports' on various topics;
- Developing valorisation strategies and guidance to help the logistics sector to exploit R&I project outcomes and facilitate implementations (D3.1);
- Disseminating best practices and raising awareness of benefits of Implementing R&I project outcomes;
- Cooperating with other Horizon 2020 CSA projects to launch a Task Force on Advancing Innovation Uptake for Sustainable Transport[21] for disseminating best practices, raising awareness, capacity building, and advocating for specific funding to bridge the gaps in TRL.

[21] Detailed information about the Task Force can be found: https://www.etp-logistics.eu/launch-of-the-task-force/

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Annex: Methodology of Developing BOOSTLOG Cloud Report

BOOSTLOG analyses the R&I results and outcomes at a Cloud (topic) level. Outcomes are then analysed based on the TRL of the project results and further development of the TRL achieved. The organizations with most prominent participation in projects for each Cloud are then identified, as well as individual people from those organizations participating in the projects contacted (i.e. experts).

Semi-structured interviews have been performed to key experts, with the ultimate goal of validating the identified outcomes and gather additional ones, as well as to investigate which outcomes have resulted into implementation cases (i.e. they have been implemented and adopted by the freight transport and logistics stakeholders).

The interviews are the main input for each cloud report, complemented with the desk research on projects deliverables and communications, market/sector current practice analysis and the market solutions implemented and adopted including examples of implementation cases. The draft report is then shared with the experts for further input and discussion through an online workshop for validation of the report. The experts validated report will be then presented in a webinar with ALICE members and other stakeholders through BOOSTLOG partners networks. The methodology to develop such reports can be seen in the following figure:

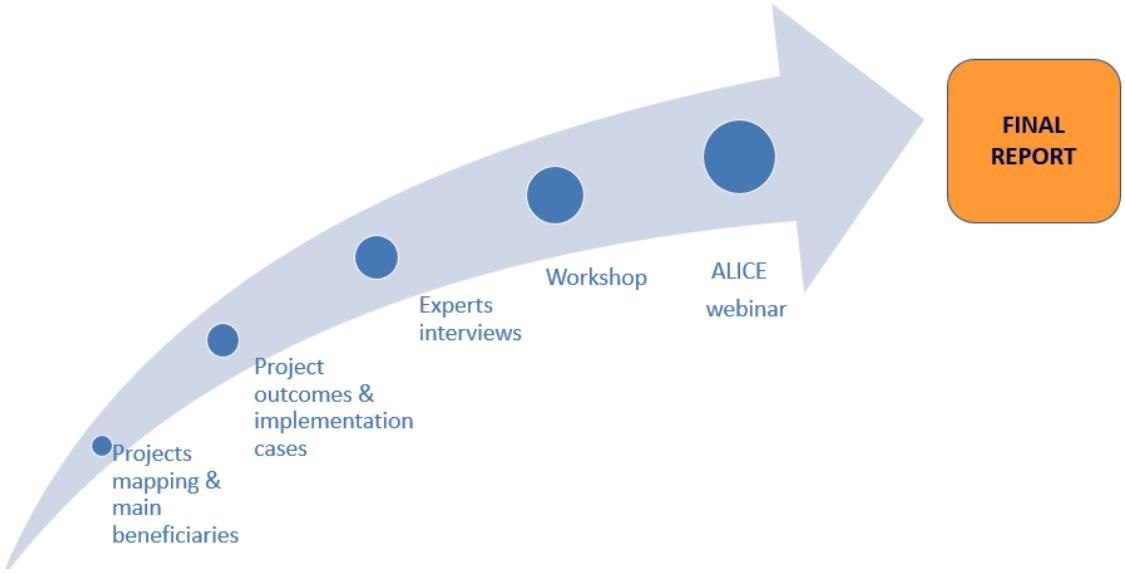

Figure 6. Methodology for a cloud report development