Study to develop EU level Simplified Cost Options (SCOs) and other EU level results-based tools in the programming period 2021-2027 in the sectors of Health, ICT and Environment

Final report

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List of abbreviations

CF: Cohesion Fund

CPR: Common Provisions Regulation

DG REGIO: Directorate General for Regional and Urban Policy

EC: European Commission

ERDF: European Regional Development Fund

EU: European Union

ESF: European Social Fund

FNLC: Financing not linked to costs

HICP: Harmonised Index of Consumer Prices

ICT: Information and Communication technology

LCI: Labour Cost Index

OLS: Ordinary Least Squares

OP: Operational Programme

PPE: Personal Protective Equipment

ROP: Regional Operational Programme

RRF: Recovery and Resilience Facility

SCO: Simplified Cost Option

SME: Small Medium Enterprise

Executive summary

This study was launched to develop EU level Simplified Cost Options (SCOs) in multiple areas supported by the European Regional Development Fund (ERDF) and Cohesion Fund (CF) in the programming period 2021-2027. The methodology used in this study is aligned with the provisions of Article 94 of the Common Provisions Regulation (CPR). More specifically, it builds on the analysis of verified historical data collected at national and/or regional levels and statistical inference where historical data is insufficient or unavailable. The study elaborates on potential EU level SCOs in the following areas relevant to ERDF/CF:

- Health **(Area 1),** focusing on the development and use of a uniform electronic health care information system (**sub-area 1.1**), new digital primary care services to improve patient access to health care (**sub-area 1.2**); and the purchase of personal protective equipment (PPE) to address emergency situations (**sub-area 1.3**)

- ICT **(Area 2),** promoting e-services for SMEs (**sub-area 2.1**), raising the digital security profile of SMEs (**sub-area 2.2**), developing inter-connection registers to implement the once-only principle (**sub-area 2.3**), developing services to fulfill essential requirements of a life event (**sub-area 2.4**) and developing e-service applications (**sub-area 2.5**).

- Environment **(Area 3),** developing digital solutions/applications to improve monitoring and management of drinking water sources (**sub-area 3.1**), new/ modernised drinking water infrastructure (**sub-area 3.2**) and the installment of green roofs (**sub-area 3.3**)

The study team devised a methodology with six operational steps:

- **Step 1: Structuring** preparations for data collection during the inception phase.

- **Step 2: Collecting data from EU Member States** on interventions (funded by ERDF and CF and/or national and regional sources eligible under ERDF/CF). Data collection covered all 27 Member States, requiring a team of national experts.

- **Step 3: Collecting data from alternative sources**. In addition to data from national authorities collected during Step 2, Step 3 expands the data with studies, maps of interventions, statistical and databases to triangulate, calibrate and extrapolate the historical data.

- **Step 4: Interpreting and analysing** the data to ensure consistency, comparability and robustness.

- **Step 5: Methodologies and calculating SCOs** to develop options for EU level SCOs. This includes the methodology to extrapolate costs for Member States that lack complete and robust data; defining a detailed scope (categories of costs, types of activities and/or operations) of each option; agreeing the options with DG REGIO; and calculations with detailed descriptions of the SCO options (one per Member State) and proposals for adjustment mechanisms.

- **Step 6: Defining and checking an audit trail**. This includes identifying an audit trail between the Commission and ERDF/CF Managing Authorities to ensure control over key deliverables and sound financial management.

During the preparations, key issues were identified that could hinder the development of SCOs in these areas. Most of the interventions were funded through umbrella projects, making it challenging to extract detailed data. Funding for operations was not executed on a large scale, and numerous projects were still in progress.

Throughout the data collection and initial qualitative analysis, these issues were further substantiated. It became evident there were significant overlaps among the sub-areas, with a majority of projects covering activities related to multiple sub-areas. Additionally, due to the interconnected nature of these activities, national experts and the study team could not allocate costs and outcomes to distinct sub-areas. This was particularly notable in 1.1/1.2, 2.1/2.2, and 2.3/2.4/2.5. Due to this limitation, the study team, in agreement with the EU Commission, merged some of these sub-areas together.

In particular, the health policy area passed from three to two sub-areas:

- 1.1/1.2 – Digitalisation of healthcare

- 1.3 – Purchase of PPE necessary to address emergency situation.

Under the second policy area of ICT five sub-areas passed to two:

- 2.1/2.2 – Digital transformation of SMEs

- 2.3/2.4/2.5 – Digitalisation of public services

For sub-area 3.1, insufficient data and a lack of information from alternative sources meant it was not possible to develop SCOs.

Data from alternative sources was also used mainly when historical data had insufficient granularity and detail. This needed statistical inference (linear extrapolation using Ordinary Least Squares – OLS) and indexation to accommodate Member States not, or only partially covered by historical data.

The result is a **mixture of EU-level solutions** in the form of **unit costs** and **lump sums**.

Area	Sub-area	Data availability	Type	Indicator
Health	1.1/12 - Digitalisation of healthcare	3 Member States (ES, MT, PT)	Unit cost	CO 36 Population covered by improved health services Population of a certain area expected to benefit from the e-health services supported by the project.
Health	1.3 – Purchase of PPE necessary to address emergency situations	6 Member States (ES, FR, IT, PL, SK)	Unit cost	Days of hospitalisation per patient
ICT	2.1/2.2 - Digital transformation of SMEs	10 Member States (BG, CY, CZ,, ES, FR, EL, HR, IT, MT, PL).	Lump sum	SME receiving grant conditional only on completion of digital transformation activities.
ICT	2.3/2.4/2.5 - Digitalisation of public services	3 Member States (BE, IT, MT)	Unit cost	Population covered by improved e-governance service Population expected to benefit from the e-governance service supported by the project.
Environment	3.2 - Constructing/modernising	2 Member States (EL and PL)	Unit cost	CO 18 Additional population served by improved water supply

Area	Sub-area	Data availability	Type	Indicator
	drinking water infrastructure	12		
Environment	3.3 - Installing green roofs	3 Member States (FI, EL, SK)	Unit cost	Surface of green roof installed in m2.

Introduction

Over the last decade, the European Commission has committed to simplifying the implementation of EU funding programmes and adopting result-focused approaches. A significant achievement has been the introduction and expansion of SCOs.

In 2011, the Commission introduced a Simplification Agenda within the Multiannual Financial Framework (MFF) 2014–2020[1] to reduce programme numbers, enhance rule coherence, clarify objectives, simplify decision-making and transition to electronic governance. Later, the Commission announced the EU Budget Focused on Results, seeking to maximise budget effectiveness for growth, jobs and stability across Europe. In 2016, the Financial Regulation amendment further expanded the use of targets in EU programme implementation.

Despite these efforts, the 2017 Reflection Paper on EU Finances highlighted the ongoing need for increased simplification and flexibility to enhance spending efficiency and performance focus[2]. This drive for results continued in the 2018 Omnibus Regulation, extending the use of SCOs in ESI Funds and introducing a new form of financing not linked to costs (FNLC) but based on the fulfilment of conditions[3]. Also in 2018, the European Commission adopted proposals for a new MFF for 2021-2027. The CPR[4] contained around 80 simplification measures for Cohesion Policy 2021-2027. The High-Level Group on Simplification for post 2020 recommended further simplifying the management of Cohesion Policy through increased use of SCOs and FNLCs.

SCOs were first introduced during the 2007-2013 period and have since gained recognition as a highly effective simplification measure under Cohesion Policy. A study carried out by DG REGIO in 2018 indicates that *the highest potential for reductions of administrative costs and burden lies with a massively increased uptake of SCOs, following an extension of their scope[5]*. Various working documents and evaluation/audit reports point out that the increased use of SCOs offers multifaceted advantages:

- Significantly decreased administrative workload for project applications and implementation. This benefit extends to all parties involved in designing and using Cohesion Policy Funds;.

- Allow managing authorities, intermediate bodies and beneficiaries to concentrate more on achieving policy objectives and intervention priorities. This shift in focus from financial justification to results is crucial to improve programme outcomes.

- Less complex control procedures under SCOs speed up the reimbursement of expenditure to beneficiaries, improving cash flow and financial management;

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1 Commission Communication to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on A Simplification Agenda for the MFF 2014–2020, COM(2012) 42.

2 European Commission, The Reflection Paper on the Future of EU Finances, 2017.

3 Regulation (EU, Euratom) No 2018/1046 of the European Parliament and of the Council of 18 July 2018 on the financial rules applicable to the general budget of the Union.

4 COM(2018) 375 final – Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL laying down common provisions on the European Regional Development Fund, the European Social Fund Plus, the Cohesion Fund, and the European Maritime and Fisheries Fund and financial rules for those and for the Asylum and Migration Fund, the Internal Security Fund and the Border Management and Visa Instrument.

5 The European Commission, New assessment of ESIF administrative costs and burden, Final Report, SWECO, t33 & Spatial Foresight, 2017

- Pre-established and published SCOs provide beneficiaries with predictable rates for cost calculations. This enables better planning and fosters transparency and equal treatment among beneficiaries;

- SCOs lower the probability of errors in cost declarations.

Despite the numerous benefits of SCOs, several factors have limited their use. In particular, substantial investments in time, resources, and expertise required to formulate SCO approaches, as well as the potential risk of systemic repercussions resulting from calculation errors. Consultations within the Transnational Network and the Transnational Network subgroup on EU Level SCOs indicate that EU level SCOs are an effective solution to address both aspects. They would alleviate administrative burden for managing and audit authorities, which do not have to develop or assess/audit the schemes and, at the same time, ensure legal certainty around the methodology.

Aligned with these policy advances and recognising the need for further ERDF/CF management simplification, the European Commission's Directorate-General for Regional and Urban Policy commissioned a study. This study aims to facilitate the adoption of EU-level SCOs under the ERDF/CF for the 2021-2027 programming period. To this end, the study covers the following policy areas:

- Health (**Area 1**), focusing on the development and use of a uniform electronic health care information system (**sub-area 1.1**), new digital primary care services to improve patient access to health care (**sub-area 1.2**); and the purchase of PPE to address emergency situations (**sub-area 1.3**).

- ICT (**Area 2**), to promote e-services for SMEs (**sub-area 2.1**), raise the digital security profile of SMEs (**sub-area 2.2**), develop inter-connection registers to implement the once-only principle (**sub-area 2.3**), develop services to fulfill essential requirements of a life event (**sub-area 2.4**) and develop e-service applications (**sub-area 2.5**).

- Environment (**Area 3**): construct/modernise drinking water infrastructure (**sub-area 3.2**) and instal green roofs (**sub-area 3.3**).

The report is structured in three chapters. Chapter 1 introduces the methodology used by the study team to collect, clean, and analyse the data used to develop proposed EU-level SCOs. Chapter 2 presents study findings and results, focusing on appropriate and feasible alternatives for EU-level SCOs. Chapter 3 summarises the analyses and recommendations for each area. Four annexes accompany the report and can be found at the end of this document.

1. Methodology

The scope of the study is to develop EU level SCOs (Art.88(4) CPR) for each Member State in the three policy areas: Health (Area 1), ICT (Area 2), and Environment (Area 3). These areas and related actions/interventions were identified by the Member States as relevant and feasible to develop EU level SCOs. To achieve this, the study team devised a methodology with six operational steps (Figure 1):

- **Step 1: Structuring,** which covers all preparations in the Inception phase. The survey of DG REGIO Transnational Network members at the end of July 2022, the Focus Group at the end of September and other minor activities to help structure the data collection and ensure a uniform understanding of the task in all the Member States.

- **Step 2: Collecting data from EU Member States** on interventions (funded by ERDF and CF and/or national and regional sources eligible under ERDF/CF). The data collection covered all 27 Member States requiring a team of national experts. Some Member States did not fund any, while others did not fund all, of the specified interventions.

- **Step 3: Collecting data from alternative sources**. In addition to historical data collected during Step 2, this Step expands the data collection with studies, maps of interventions and statistical databases to triangulate, calibrate and extrapolate the historical data.

- **Step 4: Interpreting and analysing the data** to ensure consistency, comparability and robustness. This will be implemented largely in parallel with Steps 2 and 3 to also collect missing or additional data from Member States. This Step also entails triangulating the sample with alternative sources. This Step may include merging historical and alternative sources for a more complete sample if historical data is inadequate.

- **Step 5: Methodologies and calculation of SCOs**. This includes developing options for EU level SCOs, including a methodology to extrapolate costs for Member States that lack complete and robust data; defining a detailed scope (categories of costs, types of activities and/or operations) of each option to be calculated; agreeing the preferred options with DG REGIO; and calculations with detailed descriptions of the rate for SCOs per Member State, including proposals for adjustment mechanisms.

- **Step 6: Defining and checking an audit trail**. This includes identifying an audit trail between the Commission and ERDF/CF Managing Authorities to ensure control over key deliverables and sound financial management.

Figure 1: Logical framework

Steps carried out by the study team for to develop EU-Level SCOs

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Source: Consortium
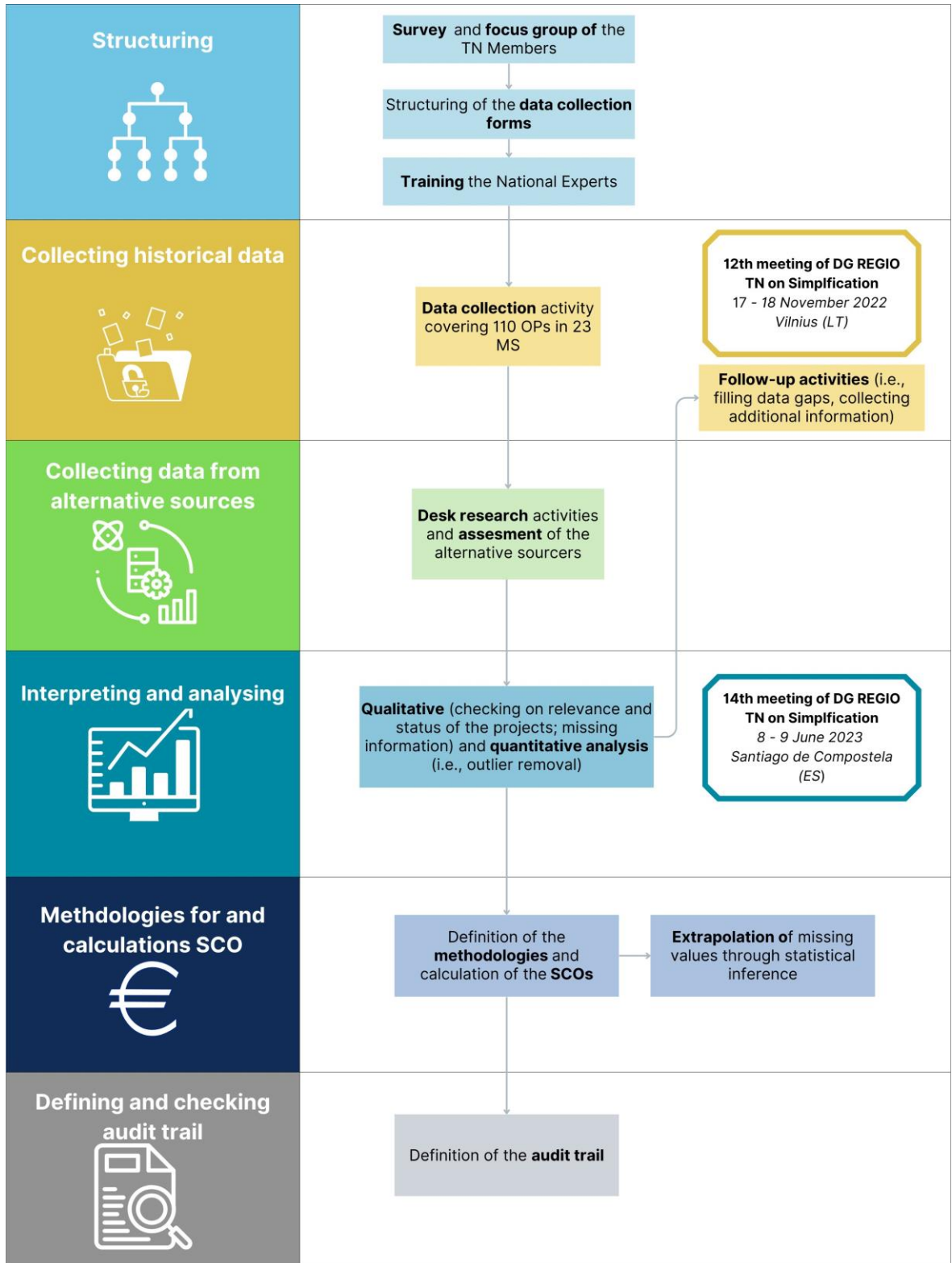
1.1. Structuring data collection

Tasks during the Inception Phase focused on preparing the data collection by a) initially mapping Operational Programmes (OPs) which funded relevant operations, b) validating the data collection tools and c) training the national experts in charge of data collection. The inception phase was organised around the following activities:

- Survey of DG REGIO Transnational Network on Simplification practitioners;

- Focus group in Brussels with Transnational Network members;

- Additional actions to address gaps in survey information;

- Finalising data collection forms;

- Training national experts.

Survey of Transnational Network Members

The survey was launched on 29 July 2022 and closed on 15 September 2022 to:

- Initially map ERDF/CF OPs that funded operations under the three policy areas;

- Identify alternative sources for data (e.g. interventions under other EU-funded programmes or national schemes);

- Identify people to contact to collect historical data.

The survey was circulated to Transnational Network Members with a short background note presenting the survey, the policy areas and the relevant sub-areas covered by the study.

By the end of September information was provided by representatives of 22 Member States, (Austria, Belgium, Cyprus, Czechia, Denmark, Germany, Estonia, Greece, Finland, France, Croatia, Hungary, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Sweden, Slovenia, and Slovakia). Of these, 17 filled in the form, four (Austria, Denmark, Luxembourg, and Sweden) declared that interventions addressed by the study were not funded by any of their Ops and the Netherlands provided general information (by email). Italy provided information on two Regional Operational Programmes (ROPs) in October and November, while France sent updated information in December. The table below presents the number of Member States and ERDF/CF Ops funding each intervention (sub-area).

Table 1 – Survey results

Updated information on the number of Member States and Ops that funded each sub-area

Sub-area	MS	ERDF/CF OP
1.1 – Development and use of uniform electronic health care information system	13	25
1.2 – New digital primary care services to improve patient access to health care	9	19
1.3 – Purchase of personal protective equipment necessary to address emergency situations	11	39

Sub-area	MS	ERDF/CF OP
2.1 - Promoting e-services for SMEs	16	23
2.2– Raising the digital security profile of SMEs	10	15
2.3 – Development of inter-connection registers with a view of implementing the once-only principle	12	17
2.4 – Development of services to fulfil essential requirements of a life event	9	18
2.5 Development of an e-service application	13	24
3.1 – Developing digital solutions/applications to improve monitoring & management of drinking water sources	10	20
3.2 – Constructing/modernising drinking water infrastructure	14	28
3.3 – Installing green roofs	7	13

Source: Consortium

The information received may not offer a comprehensive view for all countries. For instance, Germany and Belgium provided data for one OP each: Sachsen-Anhalt OP and Flanders OP. The table below indicates Ops for which information was collected though the survey. Most of the Member States funded interventions for just 1 or 2 of the policy areas: Health, Environment, and ICT.

Table 2 – Overview OPs covered by the survey

Updated information on Member States and OPs that funded at least one sub-area

MS	ERDF/CF OPs
BE	● OP Flanders - ERDF
CY	● Competitiveness and sustainable development OP – ERDF/CF
CZ	● Integrated Regional OP - ERDF ● Enterprise and Innovation for competitiveness OP - ERDF ● Prague - Growth Pole OP – ERDF/ESF ● Environment OP – ERDF/CF
DE	● Sachsen-Anhalt OP -ERDF
EE	● Cohesion Policy Funding OP – ERDF/CF/ESF
EL	● Central Macedonia OP – ERDF/ESF ● Eastern Macedonia-Thrace OP- ERDF/ESF ● Crete OP – ERDF/ESF ● Thessaly OP – ERDF/ESF ● Transport Infrastructure, Environment and Sustainable Development OP – ERDF/CF
FI	● Sustainable growth and jobs – ERDF/ESF
FR	● Auvergne OP – ERDF/ESF (Auvergne Rhône Alpes)

	● Rhône Alpes OP – - ERDF/ESF (Auvergne Rhône Alpes) ● Guadeloupe OP – ERDF/ESF ● Guyane OP – ERDF/ESF ● Réunion OP – ERDF ● Languedoc-Roussillon OP – ERDF/ESF (Occitanie) ● Midi-Pyrénées et Garonne OP – ERDF/ESF (Occitanie) ● Nord-Pas de Calais OP – ERDF/ESF (Haut de France) ● Picardie – ERDF/ESF (Haut de France) ● Bourgogne OP – ERDF/ESF (Bourgogne Franche Comté) ● Franche Comte et Jura OP – ERDF/ES (Bourgogne Franche Comté) ● ROP Centre 2014-2020 ERDF/ESF ● ROP Aquitaine 2014-2020 (Nouvelle Aquitaine) ● PO Poitou-Charentes (Nouvelle Aquitaine) ● PO Limousin (Nouvele Aquitaine)
HR	● Competitiveness and Cohesion OP – ERDF/ESF
HU	● Environmental and energy efficiency OP – ERDF/CF
IT	● ROP Sardegna ERDF ● ROP Valle d'Aosta ERDF
LT	● EU Structural Funds Investments OP – ERDF/ESF/CF
MT	● Fostering a competitive and sustainable economy to meet our challenges OP – ERDF/CF
NL	● West Netherlands OP – ERDF
PL	● ROP Kujawsko-Pomorskie Voivodeship – ERDF/ESF ● ROP Lubelskie – ERDF/ESF ● ROP Dolnośląskie Voivodeship – ERDF/ESF ● ROP Wielkopolskie Voivodeship – ERDF/ESF ● ROP Pomorskie Voivodeship – ERDF/ESF ● ROP Łódzkie Voivodeship – ERDF/ESF ● ROP Małopolskie Voivodeship – ERDF/ESF ● ROP Opolskie Voivodeship – ERDF/ESF ● ROP Śląskie Voivodeship – ERDF/ESF ● ROP Podlaskie Voivodeship - ERDF/ESF ● OP Warmińsko-Mazurskie Voivodeship – ERDF/ESF ● Infrastructure & Environment OP – ERDF/CF ● OP Digital Poland – ERDF
PT	● Azores Regional OP – ERDF/ESF ● Sustainability and Resource Use Efficiency OP – CF ● Competitiveness and Internationalisation OP – ERDF/ESF/CF ● Centro Regional OP – ERDF/ESF ● Madeira Regional OP – ERDF/ESF
RO	● Competitiveness OP – ERDF ● Large Infrastructure OP – ERDF/CF
SI	● OP for the Implementation of the EU Cohesion Policy – ERDF/ESF/CF
SK	● Quality of Environment OP – ERDF/CF ● Integrated Infrastructure OP – ERDF/CF

Source: Consortium

Finland, Hungary, Slovenia, Slovakia, and Malta also provided information on interventions funded from sources other than ERDF and CF. These include European Social Fund (ESF), national sources, and the Recovery and Resilience Facility (RRF). Detailed information on the survey responses per policy area can be found in Annex 4 – Survey Results.

Focus group with Transnational Network Members

An online focus group with Transnational Network members, using Microsoft Teams on 30 September 2022 was to:

- Present the study objectives and key tasks.

- Inform and consult stakeholders in each Member State on the data collection process.

- Present and discuss key outcomes of the Transnational Network survey, to collect more detailed information from Member States on (i) how actions/interventions were implemented in 2014-2020 under ERDF/CF in each Member State, (ii) availability of data on costs, outputs and results related to actions/interventions and (iii) data owners who should be contacted by the national experts.

- Discuss the draft data collection forms and process, to identify challenges and address them before the process is launched.

- Facilitate ownership and commitment of managing authorities in Member States.

The following documents were circulated to participants before the meeting:

- The meeting agenda,

- A background note presenting the study context and results of the survey.

The focus group included two plenary sessions and a group discussion. During the plenary meeting, the study team introduced the study, with a focus on data collection and a quick analysis of the survey results. After the meeting, the participants were split into three groups to discuss the availability of data in Member States, after which all participants returned to the plenary to summarise the results.

The group discussions focused on two questions:

I) Availability of data at the level of relevant activities/costs.

Almost all the Member States maintained that project level data is available. Nevertheless, for most representatives, several measures (in particular for ICT) are part of umbrella projects including several activities. This implies that identifying the cost of a specific intervention requires further disaggregating data from project to activity level.

However, the discussions highlighted that it is not possible to automatically extrapolate information on single activities within a project from the central IT database. To access this level of information requires consulting the documentation of each project (e.g. proof of expenditure such as invoices and time-sheets). This documentation is usually stored in the IT system as attachments and contains very detailed data that are not automatically reported in the central database.

From the discussion with Member States representatives, it also emerged that:

- Most of the projects were not finalised yet, so verified expenditure was not normally available.

- Very heterogeneous cost structures among the OPs make it hard to standardise.

2) Available information about outputs and results of the measures.

Different data is collected to monitor intervention outputs/results, with OPs using different indicators:

- Common ERDF/CF indicators,

- Programme indicators,

- Beneficiary specific indicators.

The group discussion revealed there is no exhaustive common indicator used by several programmes. This makes it more difficult to understand which data could be a common denominator for these interventions. For the intervention areas covered by this study, it was necessary to collect information for individual indicators used by the different OPs to check for any common ground.

Additional Activities

For Member States that had not submitted information on the availability of data by the end of September, the study team conducted a desk analysis to identify OPs to include in the data collection. This analysis used the Cohesion Open Data platform[6] as a source. The study team preliminarily matched the 11 study interventions (sub-areas) with intervention fields outlined in Commission Implementing Regulation (EU) No 215/2014 (Table 3). While there might not be an exact alignment between the two dimensions, this comparison proved valuable in identifying OPs that had financed activities in the relevant fields and could potentially support operations covered by the study.

For sub-area 1.3 the coronavirus specific indicator CV6 monitoring the number of items of personal protective equipment (PPE) was taken into consideration.

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[6] https://cohesiondata.ec.europa.eu/

Table 3 – Study intervention areas and intervention fields

Arbitrary matching of study-sub-areas with Cohesion Policy intervention fields

Intervention fields/Indicator	Study interventions (sub-areas)
081 - ICT solutions addressing healthy, active ageing & e-Health	1.1/1.2
112 - Enhancing access to services	1.1/1.2
Items of personal protective equipment (PPE)	1.3
066 - Advanced support services for SMEs	2.1
082 - ICT Services & applications for SMEs	2.1/2.2
078 - e-Government services & applications	2.3/2.4/2.5
079 - Access to public sector info. (including e-tourism, e-culture)	2.3/2.4/2.5
080 - e-Inclusion, e-Accessibility, e-Learning & e-Education	2.3/2.4/2.5
021 - Water management & drinking water conservation	3.1
020 - Water infrastructure for human consumption	3.2
085 - Biodiversity, nature protection & green infrastructure	3.3

Source: Consortium

After identifying the OPs that could have potentially funded relevant interventions, the national authorities or, in some cases, the managing authorities were contacted by the national experts. These bilateral meetings were to verify and confirm whether relevant information was available and could be shared.

This approach was also used for Member States that provided information for a limited number of OPs.

Finalisation of the data collection form

Data collection was guided and structured using forms developed specifically for this assignment. After the focus group, the 11 data collection tools, one for each of sub-area covered by the study, were finalised based on feedback from the Member States. The forms asked managing authorities and intermediate bodies to provide the following information:

- *source of funding*, i.e. if ERDF, CF or national funds had financed the projects;

- *type of operation*, i.e. which of the 11 interventions within the 3 policy areas;

- *any national or regional SCOs adopted in this area* and their application in the projects;

- *reference information*, i.e., number, title, eligibility period and eligibility rules related to the projects;

- *activities supported*, including activities listed in the data collection forms (see Table 4);

- *verified cost*, for the entire project and disaggregated for supported activities;

- *results and/or outputs*, monitored through indicators or other national/programme specific indicators;

- *additional information,* comments and clarifications.

Adjustments based on information collected during the preparatory activities, addressed these key points:

- Data at project level (i.e. no aggregated at programme/call level). This was because the operations covered are usually implemented through 'umbrella projects' with complex structures. Employing a higher aggregation level would hinder the level of granularity to calculate SCOs. Since the number of operations funded was expected to be low, data at project level provided more records.

- General indicators were introduced (i.e.'Total number of users (citizens using the service)'). This tackled both the heterogeneity of indicators monitoring these types of operations and the lack of a common indicator describing the result/output of some of these (i.e. 2.3, 2.4, 2.5, 3.1). These indicators ('Number of registries created', 'Total number of users (citizens using the service)', 'Surface of the green roof installed in m2') gather potentially analogue indicators adopted by the OPs.

Table 4 – Activities included in the data collection form

Activities in the data collection form of each sub-area

Sub-area	Typology
1.1 - Development and use of uniform electronic health care information system	- Digital provider costs - Purchase, installation, and maintenance of IT equipment - Network equipment for broadband internet - Purchase, installation, update and upsize of software - Software licensing - Information security - Consulting and training fees - Staff costs, provision of training - Information and promotion - Maintenance costs - Overheads
1.2 - New digital primary care services to improve patient access to health care	- Staff costs - Lab costs - Diagnostics

Sub-area	Typology
	• Overheads • Management costs • Office space • Equipment • Technical development of smart applications • Fee for consultation
1.3 - Purchase of personal protective equipment necessary to address emergency situations	• Aprons • Coveralls • Face shields • Gloves • Goggles • Protective glasses • Gowns • Particulate respirators protective clothing/scrubs • Shoe protective covers/overboots/overshoes • Disposable headwear (caps, hoods, head covers hairnets).
2.1 - Promoting e-services for SMEs	• Set up and maintenance of applications • Costs of domain • Server and / or cloud services for the implementation of activities • Internet connectivity • Hardware/software purchase and licensing • Consulting • Training
2.2 - Raising the digital security profile of SMEs	• Costs of domain, server and / or cloud services for the implementation of activities • Internet connectivity • Hardware / software purchase and licencing • Staff costs • Training
2.3 - Develop inter-connection registers with a view of implementing the once-only principle	• Costs of technical specifications • Costs of user needs analysis • Purchase, installation, and maintenance of IT equipment • Network equipment for broadband internet • Purchase, installation, update and upsize of software • Quality control costs • Publicity costs • Subscription- based costs/licenses • Training costs • Staff costs • Project management costs • Security costs
2.4 - Develop services to fulfil essential requirements of a life event	• Costs of technical specifications • Costs of user needs analysis

Sub-area	Typology
	- Purchase, installation, and maintenance of IT equipment - Network equipment for broadband internet - Purchase, installation, update and upsize of software - Quality control costs, publicity costs - Subscription- based costs/licenses - Training costs - Staff costs - Project management costs - Security costs
2.5 - Develop e-service application	- Setting up and maintaining applications - Purchase, installation, update and upsize of software - Purchase, installation, and maintenance of IT equipment - Network equipment for broadband internet - Publicity costs - Subscription-based costs/licenses - Training costs - Project management costs
3.1 - Develop digital solutions/applications to improve monitoring & management of drinking water sources	- Costs of technical specifications - Costs of user needs analysis - Purchase, installation, and maintenance of IT equipment - Network equipment for broadband internet - Purchase, installation, update and upsize of software - Quality control costs - Publicity costs - Training costs - Staff costs - Project management costs - Security costs
3.2 - Construct/modernise drinking water infrastructure	- Construction water infrastructure, - Repair and rehabilitation costs - Project management - Overheads
3.3 - Installing green roofs	- Feasibility studies - Preparation plans - Construction costs - Equipment/material - Plants/seeds - Staff costs - Maintenance - Project management costs

Source: Consortium

Training national experts

The focus group highlighted that the requested historical data was often not available from central management systems and had to be collected at the level of intermediate bodies, in some cases directly from project documentation. To facilitate this, a pool of experienced national experts ensured that authorities were supported throughout the data collection activity. These experts were responsible for disseminating data collection forms to the managing authorities and intermediate bodies in each Member State, helping them fill in the forms and maintaining constant communication throughout the exercise.

Before launching the data collection, a series of activities ensured a coherent approach among all Member States and uniform understanding of the grid. On 12 October 2022 the study team briefed all the national experts on the purpose of the study, the areas covered and the data collection form, rules to be followed when collecting data. The team also addressed their doubts.

After the meeting, the study team provided all national experts with a toolkit to support them:

- Comprehensive guidelines provided background information on the study, instructions on filling in the data collection form, the timeline, and a Q&A section based on experience from the previous study.

- Country-specific sheets contained information on the Member State in question collected through surveys, focus groups and desk research. These sheets streamlined the data collection process by providing essential reference points. They included information on the OPs and contact people for each sub-area.

- A letter of support issued by the European Commission.

1.2. Collecting historical data

Data collection covering all three policy areas was launched on 3 November 2022. The national experts established contact with 117 Operational Programmes in 23 Member States. Austria, Denmark, Luxembourg, and Sweden were excluded from this group, having indicated they did not fund any interventions relevant to the study.

The selection criteria for Member States and specific programmes were determined during the preparations, as described in the previous section. This process was based on feedback from Transnational Network members in the survey. For Member States that did not reply to the survey, OPs were identified through desk research and consultations with national and managing authorities.

Data were received from 78 OPs from 22 Member states. The study team investigated why some Member States could not provide data for specific sub-areas. Some of the common responses were:

- No relevant interventions;

- Even if relevant interventions were implemented, data extraction from projects posed significant challenges as the projects were not monitored at a level of detail that matched the requirements.

- Some interventions were still in progress, so complete data was unavailable.

The study team performed a rigorous check to determine the suitability of the data to develop EU-level SCOs. Where data was unavailable or unclear, the study team organised

follow-ups with the Member States to confirm availability, fill out data gaps or better interpret them, including:

- Clarifying the relevance of operations monitored with indicators that did not appear appropriate;

- Checking the currency used by the Member State;

- Filling in data gaps, especially for eligibility rules of the operations and their eligibility period;

- Correcting inconsistencies between the total cost of operations and the cost breakdown when not justified by the Member State.

In addition to these routine checks, two targeted follow-up activities were carried out due to the complex nature of the operations. Consultations with the data owners and the first qualitative analysis of the data highlighted that most of the sub-areas overlap and most projects covered activities related to more than one sub-area. Moreover, the interrelated nature of these activities made it impossible to allocate costs and results to different sub-areas. This situation concerned sub-areas 1.1/1.2, 2.1/2.2 and 2.3/2.4/2.5.

The first follow-up activity was carried out in March and April, right after submission of the interim report. This gathered extra information on activities including further details about eligible costs, types of interventions funded, and the beneficiaries. This was crucial to establish a coherent approach to categorising these operations under the different sub-areas, as well as ensuring that records for the same sub-area were comparable. This also assessed the possibility of merging sub-areas that appeared to cover analogous activities (i.e. 1.1/1.2, 2.1/2.2, 2.3/2.4/2.5).

A last round of analysis included a more comprehensive quantitative assessment of the consolidated databases. For sub-areas 1.1/1.2 and 2.3/2.4/2.5, the indicators monitoring digitalisation of health and public service differed greatly. The research team dedicated June and July to re-contact OPs that had provided high-quality data on these indicators to integrate and re-evaluate the information. For the other areas, additional data that could enhance data quality and yield more accurate SCOs were identified. Consequently, national experts were activated once more to investigate the feasibility of collecting this information. In some cases, the data owners were directly contacted by the study team.

Table 32 in Annex 1 - Programmes involved in the data collection displays the data availability for each OP. The final columns encompass all Member States engaged in the follow-up activities. The '1st follow-up' column includes Member States contacted for routine checks that sometimes took place at the same time.

1.3. Data from alternative sources

The study team took into consideration the possibility that the quality and quantity of data from Member States might be insufficient to develop EU-level SCOs. These limitations were confirmed during the preparations. The limited data and considerable heterogeneity were already emphasised at that stage by the Member States. Additionally, data collection revealed that for certain areas there was limited historical data available (specifically, areas 3.1 and 3.3). The data collected in this activity can be potentially used in three ways:

- To triangulate with historical data (benchmarking, assessing quality).

- As the main source of data, with the indicators acting as proxies for standard information not provided by Member States.

- As a complementary data source (for data gaps) where interpolation can complete the data for activities/cost categories.

The alternative sources identified are outlined in the table below (Table 5).

Table 5 – Alternative data sources

Alternative data sources for each sub-area

Sub-area	Source	Pros	Cons	Adopted
1.1/1.2	Tenders Electronic Daily (TED). Available here.	● Many public contracts are available under the labels 'Electronic health care information system' and 'Digital Primary care services'.	● The filters on the TED platform are not specific enough to easily identify projects in these sub-areas. ● The initial intention was to use, the number of beds in the hospitals where the operations were implemented as a denominator for these cost amounts. However, a pilot on a limited number of countries showed this information was not always readily available.	✖
1.3	Report: '*Personal protective equipment (PPE) needs in healthcare settings for the care of patients with suspected or confirmed novel coronavirus*' of the European Centre for Disease Prevention and Control (ECDC). Available here.	● This defines the minimal composition of a PPE set to be used in healthcare settings during the COVID-19 pandemic. ● It defines the amount of PPE sets to be used (i) per COVID suspected case and (ii) per day per patient, by also differentiating between mild and severe symptoms.	● It does not provide any information about the cost of PPE items or sets.	✔
1.3	Tenders Electronic Daily (TED) data taken from the portal '*Interactive Map: Europe's COVID-19 Procurement*' of the Organized Crime and Corruption Reporting Project (OCCRP). Available here.	● This portal covers over 37,800 COVID-19 related tenders and contracts worth over €21 billion, from February to October 2022. The tenders cover key goods such as PPE, ventilators, tests, and medication. ● It enabled a database to calculate the average price per PPE item per country.	● It does not provide any information on the numerical need for PPE items or sets in hospitals	✖
2.1/2.2	Community Innovation Survey (CIS) - Expenditure of enterprises on innovation activities by area of	● This allows filtering by SMEs and activities related to Information and Communication (such as computer programming, consultancy and related activities, information service activities, among	● The data for most countries does not cover computer programming, consultancy, and information services. ● Many Member States have missing or confidential values.	✖

Sub-area	Source	Pros	Cons	Adopted
	expenditure (INN_CIS12_EXP). Available here.	other activities such as publishing and telecommunication).		
2.1/2.2	NIS Investment Report 2021, by ENISA (The European Union Agency for Cybersecurity). Available here.	• This covers Information Technology spending (including capital and operating expenses for hardware, software, internal personnel, contractors, and outsourcing) as well as Information Security budget/spending. • It compares the spending of SMEs versus large enterprises.	• Information on expenditure is available at Member State level but not firm size level. • Information on SME expenditure is not available at Member State level, only at EU27 level. • IT spending is presented as the aggregate of hardware, software, internal personnel, contractors. and outsourcing spending and cannot be broken down into costs for each category. • IT security spending distribution by category is only shown at EU27 level.	✘
2.1/2.2	ICT use in enterprises (ISOC_E), by Eurostat. Available here.	• This provides harmonised and comparable information on the use of ICT and e-commerce in enterprises at the European level. • It has a very extensive list of indicators such as percentage of enterprises using ICT security measures, enterprises experiencing ICT security incidents, enterprises with internet access, with cloud computing, with e-commerce and many others. • It allows filtering by enterprise size, including SMEs.	• Indicators are only percentages of enterprises, therefore it is unsuitable.	✘
2.3/2.4/2.5	The Digital Economy and Society Index (DESI). Available here.	• - This index offers useful insights about the level of digitalization in EU countries. • DESI has five principal policy areas including 'Digital public services' monitoring EU Member States performance in the field of eGovernment and eHealth. • It provides a score for: (i) e-Government users, (ii) Pre-filled forms, (iii) Digital public services for	• It does enable identification of a representative average cost per Member State, therefore it is unsuitable.	✘

Sub-area	Source	Pros	Cons	Adopted
		citizens, (iv) Digital public services for business and (v) Open data.		
3.2	European Federation of National Associations of Water Services (EurEau). 'Overview of the European drinking water and wastewater sectors- 2021'. Available here.	• This provides information on the total km of the drinking water pipe network for each Member State.	• Does not provide information on the cost of constructing/modernising drinking water infrastructure. Therefore, it is not suitable.	✖
3.2	Tenders Electronic Daily (TED). Available here.	• Many public contracts are available under 'works related to water-distribution pipelines', 'drinking water pipelines', 'pipelines supply'.	• The contracts are very heterogenous, i.e., some water treatment plants and tanks are included while others not. • It was not possible to associate cost information in the contracts to a common indicator describing the output/results. Therefore, the source is unsuitable	✖
3.3	Global Database of Green Roofs. Available here.	• This includes some 150 EU-based projects. • It provides the size of green roofs installed and short descriptions of the projects.	• There is no detailed information on funding, activities, costs, and outcomes.	✖
3.3	European Federation Green Roofs and Walls. Available here.	• This provides a list of exemplar European projects in biodiverse roofs, extensive roofs, and intensive roofs.	• The list of exemplar projects does not cover most European projects. • It does not provide any data on activities, costs, or outputs for the green roof projects.	✖

Source: Consortium

1.4. Interpreting and analysing

The development of EU-level SCOs is primarily a data driven exercise. Therefore, the study team conducted a comprehensive feasibility assessment of the quality of data used to calculate each proposed SCO alternative.

The data analysis was carried out in four steps.

Phase 1: an initial quality verification ensured the suitability of the data for calculations to develop SCOs. This involved verifying that the project was relevant to the sub-area under consideration. The projects also needed to represent the cost of the type of operation in the country. Therefore, ongoing projects still far from completion were excluded, as they often had only partial or incomplete budget information available. Furthermore, a control ensured that all projects had at least the essential information available, including verified costs and indicator values.

A data cleaning process filtered out projects that lacked these characteristics. Where information was missing or unclear, validation included reaching out to the national expert to collect additional information. If the data remained inaccessible, the projects were excluded from the analysis.

A comprehensive overview of this filtration can be found in Annex 3 - Data quality for Areas 1, 2 and 3, which provides insights into the records excluded due to:

- Irrelevance to the operations covered by the sub-area,

- Ongoing project status,

- Absence of total cost data,

- Absence of indicator value data.

After this first analysis and data cleaning it was possible to observe that for sub-area 3.1 very few records were available. Data on completed projects including total cost and indicators were provided only by Czechia (1 record), Greece (30) and Portugal (2). Due to this limitation, the study team, in agreement with the EU Commission, decided not to develop EU-Level SCOs for this area.

Phase 2: After this initial quality assessment, a number of challenges were identified. Specifically, assessing the relevance of projects to the sub-area proved to be complicated, and sometimes very few records were at our disposal. Furthermore, project categorisation among different sub-areas was not uniform. This was particularly pronounced in policy domains connected to the digitalisation of healthcare and ICT policy area, where clear-cut categorisation was often impossible based on the activities implemented by the Member States. This complexity was due to the inherent overlap of interventions covered by these sub-areas at implementation level. Additionally, the projects frequently had complex structures and substantial budgets, further complicating categorisation, especially within the sub-areas dedicated to the digitalisation of public services (2.3, 2.4 and 2.5). Notably, this primarily impacted sub-areas 1.1, 1.2, 2.1, 2.2, 2.3, 2.4 and 2.5. Also under sub-area 3.2, some difficulties were experienced in analysing the relevance of operations, since it was not always clear whether the projects covered other types of activity in addition to construction/modernisation of drinking water infrastructure such as wastewater treatment plants, or sewage infrastructure.

Consequently, further information was collected from Member States to have a more comprehensive picture of the types of activities funded within projects and proceed with a more rigorous classification. This supplementary activity was also meant to assess the possibility of merging different sub-areas covering analogues types of operations (1st follow-up activity). Ultimately, the limited data, particularly in sub-area 2.2 led to merging some sub-areas. This led to the formulation of different sub-areas within policy areas 1 and 2.

The health policy area reduced from 3 to 2 sub-areas:

- 1.1/1.2 – Digitalisation of healthcare

- 1.3 – Purchase of PPER necessary to address emergency situation.

Figure 2: Health (Area 1)

New sub-areas after aggregation of sub-areas 1.1 and 1.2
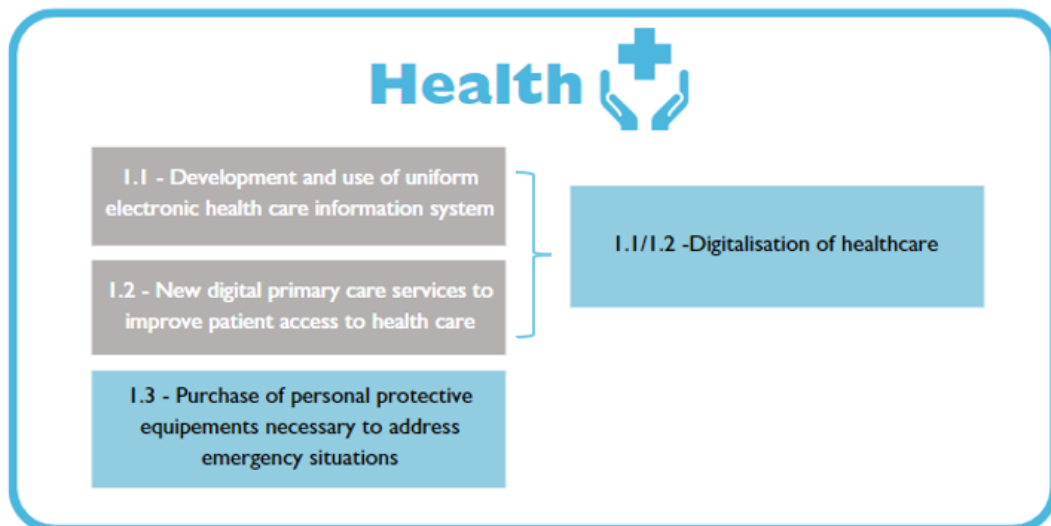
© European Union

Source: Consortium

While, under the framework of the second policy area ICT five sub-areas became two:
- 2.1/2.2 – Digital transformation of SMEs
- 2.3/2.4/2.5 – Digitalisation of public services.

Figure 3: ICT (Area 2)

New sub-areas after aggregation of sub-areas 2.1 and 2.2, as well as 2.3, 2.4 and 2.5
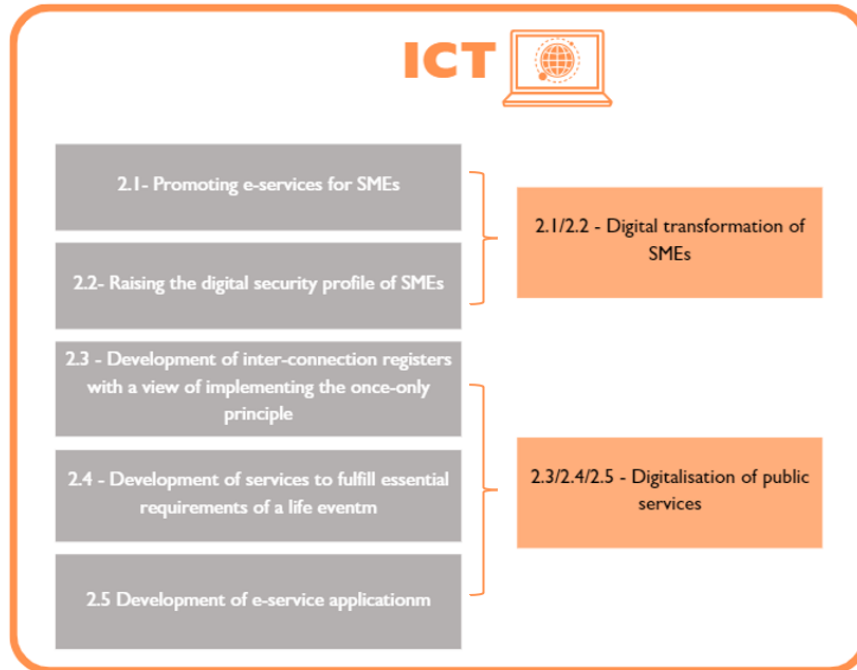
© European Union

Source: Consortium

More detailed information on the types of projects funded under the original 11 sub-areas and the reasoning behind the mergers can be found in Chapter 2.

Step 3: Following the consolidation of databases related to the new unified sub-areas, there was an additional round of analysis, diving into more quantitative aspects. This revision determined if there was still potential to enhance data quality even after the cleaning process. For the unified areas, the study team reverified data comparability, especially the indicators used to monitor the projects. To collect further information for the most frequently used indicator types, the Member States were re-contacted to confirm the consistency of different but analogous indicators. Nevertheless, the challenge persisted in areas associated with digitalisation of public services, where the lack of a common indicator remained a significant issue.

For areas 2.1 and 2.2, a final review was conducted to explore the inclusion of any missing details. This included the breakdown of costs and whether additional Member States could provide values for the common SCO indicator.

Despite the exclusion of irrelevant projects, Area 3.2 still had very different costs also within the same Member State. As a result, countries that had contributed with substantial high-quality data were once again contacted to validate the data accuracy.

Finally, for Area 3.3, some Member States provided usable data. Thus, efforts were directed towards gathering extensive details about the specific characteristics and types of green roofs installed.

All this information was collected from the Member States though the 2nd follow-up activity.

Step 4: As part of the data cleaning process, outliers were removed to ensure that only high-quality and reliable data was included in the calculations. The study team conducted interquartile analysis and applied expert judgement to reliably identify the outliers and justify their exclusion from further analysis.

Interquartile analysis

A quartile divides a data set into four equal groups, each making up 25% of the data. The top 25% is the 1st quartile, while the bottom 25% is the 4th quartile.

Calculating the interquartile range (the middle 50% of the data) subtracts the first quartile value from the third quartile value;

$$IQR = Q3 - Q1$$

Multiplying the interquartile range by 1.5 highlights outliers;

$$IQR * 1.5$$

Add 1.5 x (IQR) to the third quartile. This is the upper bound - any number greater than this is a suspected outlier;

$$Upper\ bound = Q3 + 1.5 * IQR$$

Subtract 1.5 x (IQR) from the first quartile. This is the lower bound - any number less than this is a suspected outlier.

$$Lower\ bound = Q1 - 1.5 * IQR$$

Notably, the interquartile rule does not apply to every case in the quantitative analysis. Therefore, the study team analysed each outlier in the context of the entire dataset and, where a clear choice was not evident, applied expert judgment. This type of outlier analysis is typically used whenever statistical modelling is insufficient, and when expert judgement may provide reassurance of resilience and accuracy.[7] Such outliers may occur when the quantitative sample too low for statistical methods to be ineffective. An example of where expert judgment may be applied can be found in the box below – both instances in the example would be qualified as outliers, as they contain insufficient information to explain why the amounts are so low or so high. As suggested, outliers may also occur between rather than within Member States.

Hypothetical scenario for outlier analysis based on expert judgement

- A relatively low amount of EUR 20,000 was spent by one SME on digital tranformation in several projects implemented in Member State A (a high cost of living country). Information on the scope, duration and other aspects of this activity are not provided.

- A relatively high amount of EUR 70,000 was spent by one advisory consultancy for one SME digital transformation activity in several projects implemented in Member State B (a low cost of living country). Information on the scope, duration and other aspects of this activity are not provided.

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[7] Bellini, T., (2019) in IFRS 9 and CECL Credit Risk Modelling and Validation.

1.5. SCO development and definition of the audit trail

Calculation of the SCOs shortlisted for development involved:

- developing approaches and main unit-cost estimation methods for SCOs;

- exploratory analysis to test the feasibility of different methods to establish off-the-shelf solutions;

- calculating SCO amounts for each Member State based on the historical data;

- adjusting SCO amounts to 2023 price levels based on inflation indices; and

For more details on the calculation method used for each SCO and the audit trail, please refer to Chapter 2 of the report.

For Member States that did not provide (sufficient) data, statistical inference (extrapolation) was used to establish the rates/amounts for each proposed EU-level SCO. This consisted of taking the unit cost rates and/or lump sum amounts calculated for Member States that provided the study with data and used it to predict the missing rates/amounts for the other Member States. Extrapolation has overcome data quality issues in similar studies the study team has carried out to develop SCOs at EU level.

The extrapolation involved calculating proxy rates from Member States with usable data and applying a linear regression model, with selected statistical indicators as explanatory variables, to predict the proxy rates for countries without sufficient data.

For sub-area 3.3, due to many discrepancies in the data provided by three Member States (FI, EL, SK), it was not possible to use extrapolation based on a linear regression model. Here, the study team found that indexation was the most suitable approach.

Table 6 – Proposed explanatory indicators for areas of the study

Outline of the indicators used for the extrapolation / indexation

Area	Statistical indicator	Rationale
1.1/1.2 - Digitalisation of the healthcare	• Labour cost for LCI (compensation of employees plus taxes minus subsidies) in Information and Communication and Professional, Scientific and Technical Activities (EU27_2020 = 100) (Eurostat, LC_LCI_LEV); • Price level index for Communication, Machinery and Equipment, and Software (EU27_2020 = 1) (Eurostat, PRC_PPP_IND)	These indicators consider how much labour costs and prices in economic activities related to 1.1 and 1.2 differ across Member States. Therefore, they are a predictor of the missing values for Member States that are not /partially covered in the data sample
1.3 - Purchase of PPE necessary to address emergency situations	Health care expenditure by function (Eurostat, HLTH_SHA11_HC)	This indicator details the split in healthcare expenditure. It was deemed a predictor for missing values for Member States that are not /partially covered in the data sample
2.1/2.2 - Digital transformation of SMEs	• Labour cost for LCI (compensation of employees plus taxes minus subsidies) in Information and	These indicators consider how much labour costs and prices in economic activities related to 2.1 and 2.2 differ

Area	Statistical indicator	Rationale
	Communication and Professional, Scientific and Technical Activities (EU27_2020 = 100) (Eurostat, LC_LCI_LEV); ● Price level index for Communication, Machinery and Equipment, and Software (EU27_2020 = 1) (Eurostat, PRC_PPP_IND).	across Member States. Therefore, they are deemed a predictor for missing values for Member States not /partially covered in the data sample
2.3/2.4/2.5 - Digitalisation of public services	● Labour cost for LCI (compensation of employees plus taxes minus subsidies) in Information and Communication and Professional, Scientific and Technical Activities (EU27_2020 = 100) (Eurostat, LC_LCI_LEV); ● • Price level index for Communication, Machinery and Equipment, and Software (EU27_2020 = 1) (Eurostat, PRC_PPP_IND)	These indicators consider how much labour costs and prices in economic activities related to 2.1 and 2.2 differ across Member States. Therefore, they are deemed a predictor of missing values for Member States that are not /partially covered in the data sample
3.2 - Constructing/modernising drinking water infrastructure	● Labour cost for LCI (compensation of employees plus taxes minus subsidies) in Industry construction and services (EU27_2020 = 100) (Eurostat, LC_LCI_LEV); ● Price level index for Machinery and Equipment (EU27_2020 = 1) (Eurostat, PRC_PPP_IND)	These indicators consider how much labour costs and prices in economic activities related to 3.2 differ across Member States. Therefore, they are deemed a predictor of missing values for Member States that are not /partially covered in the data sample.
3.3 - Installing green roofs	In this sub-area, extrapolation was not used. Instead, rates for Member States were calculated based on indexation. The indexation draws on the following: ● independent (predictor) variable – the MS (Member State) index combining price level index on construction and on machinery and equipment. ● dependent (response) variables – a) the Finnish rate at cost item level; b) the Greek rate at cost item level; c) the Slovakian rate at cost item level.	Due to incompatible data from three Member States (FI, EL, SK), it was not possible to use extrapolation based on a linear regression model for sub-area 3.3. Instead, the study team indexed unit cost rates according to each green roof model – Finnish, Greek and Slovakian.

Source: Consortium

To ensure the amounts/rates of the EU-level SCOs retain their relevance in future, the study team also proposed how these amounts/rates should be adjusted. To this end, we identified annually updated statistical indicators tracked by Eurostat (Table 7). These are considered to best reflect inflation affecting operations in Areas 1, 2 and 3.

Table 7 – Inflation Adjustment

Inflation adjustment index with rationale

Area	Statistical Indicator	Rationale
1.1/1.2 - Digitalisation of the healthcare	Harmonised index of consumer prices (HICP): average of Industrial Goods, Services and Communication (Eurostat, PRC_HICP_AIND). Annual average rate of change	The proposed indicator is relevant for adjusting SCO values in both sub-areas as it considers consumer price inflation in the Euro area
1.3 - Purchase of PPE necessary to address emergency situations	Harmonised index of consumer prices (HICP): average of Industrial Goods, Services and Communication (Eurostat, PRC_HICP_AIND). Annual average rate of change	The proposed indicator is relevant for adjusting SCO values in both sub-areas as it considers consumer price inflation in the Euro area
2.1/2.2 - Digital transformation of SMEs	• Labour Cost Index in Information and Communication and Professional, Scientific and Technical activities (Eurostat, LC_LCI_R2_A). Percentage change compared to previous year; • Harmonised Index of Consumer Prices in Industrial Goods, Services and Communication (Eurostat, PRC_HICP_AIND). Annual average rate of change.	The proposed indicators were considered relevant for adjusting SCO values in both sub-areas as they consider price developments of labour in selected sectors for each country compared to the previous period, as well as consumer price inflation in the Euro area.
2.3/2.4/2.5 - Digitalisation of public services	Harmonised index of consumer prices (HICP): average of Industrial Goods, Services and Communication (Eurostat, PRC_HICP_AIND). Annual average rate of change	The proposed indicator is relevant for adjusting SCO values in both sub-areas as it considers consumer price inflation in the Euro area.
3.2 - Constructing/modernising drinking water infrastructure	Harmonised index of consumer prices (HICP): average of Industrial Goods, Services and Communication (Eurostat, PRC_HICP_AIND). Annual average rate of change	The proposed indicator is relevant for adjusting SCO values in both sub-areas as it considers consumer price inflation in the euro area.
3.3 - Installing green roofs	• Price level indices (EU27=100) for construction, and machinery/equipment; • Annual inflation rates: Construction producer prices and costs; HICP (annual average rate of change) – tools and equipment for house and garden.	The proposed indicators were considered relevant for adjusting SCO values as they reflect inflation in construction and tools/equipment for house and garden.

Source: Consortium

1.6. Consultations to test and validate study outcomes

The study team consulted several TN members throughout the process in addition to the initial focus group. In particular, the following events presented the state of play and collected feedback from Member States, as well as validating the study outcomes:

- DG REGIO TN 12th meeting on Simplification 17-18 November 2022, Vilnius (LT)

- DG REGIO TN 14th meeting on Simplification 8 - 9 June 2023 Santiago de Compostela (ES)

During the 12th TN meeting in Vilnius the study team updated Member States on the launch of the data collection for all three policy areas of Health, ICT and Environment.

The presentation to TN members in Santiago de Compostela covered the state of play for SCO development in all three areas. During the meeting the outcomes of data collection and possible approaches to defining SCOs were presented. Participants then discussed in groups and provided feedback on proposed SCO alternatives for the sub-areas. They also asked for clarifications on the background notes circulated before and presentations during the meeting. Questions posed by Member States and responses from the study team are presented in the table below.

Table 8 – Questions in the TN Meeting in Santiago de Compostela

Questions addressed by the study team during the14th meeting of DG REGIO TN on Simplification 8 - 9 June 2023 Santiago de Compostela (ES)

Area	Question	Answer
All areas	Are the amounts aligned with State aid rules, and will the study please tackle this issue?	Yes, because the calculations were based on verified data. So, the amounts are in line with State aid rules.
All areas	The country provides data to develop EU level SCOs and the same data is used in the country to develop SCO methodology in calls for proposals though the amounts differ from the EU study. Would that be a problem?	No, it is not a problem. The Member State can choose to use an off-the-shelf option such as EU-Level-SCO to cover a type of operation or to develop its own methodology under art. 94.
Areas 1 and 2	Is the study considering eventual technology shift (risk the SCOs are quickly outdated).	The study considered exclusively changes in prices. An inflation adjustment method was developed for all the SCOs.
1.3	This SCO can be applied only for future similar nature emergency or retrospectively to Covid measures during PP 21-27 already implemented with actual costs?	The SCO cover the PPE requirements for patients suspected or confirmed to be infected with the coronavirus and can be used as the baseline needs for any viral syndromes.
3.2	Definition of water infrastructure (sewage included?)	The term 'drinking water infrastructure' primarily refers to the pipelines responsible for distributing clean water. It's important to note that this excludes sewage and wastewater treatment facilities.
3.2	Is the data for the study on SCOs for water infrastructure coming from existing SCOs or from procurement data?	The data presented during the meeting is historical data of operations implemented under the 2014-2020 OPs. This data refers to verified costs obtained from Member States for projects that were reimbursed based on real costs.

Area	Question	Answer
3.3	Can we have more information on the Finnish, Greek and Slovakian models to distinguish between what constitutes an innovative model, an intensive model, and an extensive model?	Details of the three models have been included in the main report.
3.3	(FL, MT, IE) Sub-area 3.3, the sample seems to be very small. Is this enough and feasible to extrapolate figures for other Member States in this area?	Extrapolation based on linear regression is not possible for the sample. To address this, the study team used indexation for the three models established in this area.

Source: Consortium.

2. Study findings

2.1. Area 1: Health

This section of the report provides the results of proposed SCOs in the policy area of Health.

The European Commission prioritises jobs, growth and investment, aiming to build a fair and inclusive Union from 2020 to 2024. Access to affordable, high-quality healthcare is crucial, given concerns about aging populations, lack of quality standards, and gaps in healthcare access across Member States. The pandemic further strained health systems, emphasising the need to increase capacity, reinforce primary healthcare, and reduce health inequalities. Digital health information systems and online services are essential to ensure accessible and high-quality healthcare for all EU citizens. In addition, the health crisis highlighted that medical products and technologies are vital to a resilient health system, bringing to light challenges in global supply chains for medicines and other healthcare products.

The study covered the following sub-areas:

- 1.1 Development and use of a uniform electronic health care information system;

- 1.2 New digital primary care services to improve patient access to health care;

- 1.3 Purchase of personal protective equipment necessary to address emergency situations.

The data collected for sub-areas 1.1 and 1.2, both pertaining to the digitalisation of healthcare, have been consolidated into a single chapter (section 2.1.1). The sub-areas were merged, and the data used to develop a unique SCO covering both types of operation. This was based on a preliminary analysis of the results and feedback during the data collection. There were significant overlaps and challenges encountered by Member States when attempting to assign operations to one specific area rather than another. For further details, please refer to Section 2.1.1.

2.1.1. Sub-areas 1.1 and 1.2: Digitalisation of healthcare

Data collection for these two sub-areas was initially carried out separately, with managing authorities asked to provide distinct data for each measure. However, reviewing the data and examining project information, it became clear that assigning projects to a specific sub-area posed challenges. Some projects originally categorised under sub-area 1.1 were more relevant to sub-area 1.2 due to their providing e-services. Examples include:

- Improving the availability and quality of services in the Independent Public Health Care Centre in Puławy by implementing electronic services (OP Lubelskie, PL).

- Implementation of e-health services in the Specialist Clinic in Olsztyn (OP Warminsko-Mazurskie, PL).

- Safe at home and in the institution - Using remote monitoring and smart-pump technology in infusion therapy (OP Sustainable Growth and Jobs, FI).

Additionally, many Member States implemented umbrella projects that encompass activities covering both sub-areas. These integrated investments aim to support digitalisation of the

health sector, establishing uniform information systems, and providing e-health services to citizens. As a result, separating these activities becomes challenging, contributing collectively to advancing the health sector. Examples of such umbrella projects include:

- Digital Health Journey (OP Nouvelle Aquitaine,FR)

- e-MCDT: Consolidation and Dematerialisation MCDT in the North Region (OP Compete, PT).

- Development of electronic medical records and electronic public services in the Commune Health Center in Raków, the Communal Health Care Center in Sobków and the Independent Public Communal Health Care Facility in Nowa Słupia (OP Swietokryskie, PL).

- Strengthening the level of digitisation and development of e-services (OP Lubelskie, PL).

- Developing eHealth services and collaborative infrastructure (OP EU Structural Funds Investments OP, LT).

These examples demonstrate the complexity of categorising digital health projects. It is also worth mentioning that few projects were provided for sub-area 1.2 (i.e. 76).

Based on the availability of data, three alternatives of SCO were considered for these two merged sub-areas under Area 1:

- **Option 1:** Lump sum per health information system/e-service created

- **Option 2:** Unit cost per population (i.e., no. of inhabitants) covered by improved health service

- **Option 3**: Unit cost per no. of users of new health information system/digital service

The rationale behind these options was to build on a common/widely used and, preferably, result-based indicator. This simplifies the task for Member States when it comes to measuring and reporting their achieved results in the future. The definitions of proposed SCO alternatives are presented in the table below.

Table 9 – Possible unit costs for sub-areas 1.1/1.2: pros and cons of three options

	Option 1	Option 2	Option 3
	Lump sum per health information system/ e-service created	**Unit cost per population (i.e., no. of inhabitants) covered by improved health service**	**Unit cost per no. of users of new health information system/digital service**
Pros	The indicator has been adopted by more Member States and covering more projects. The indicator measures use of the new ICT system/service. There are no risks of favouring more densely populated areas, since payment is triggered by use of the service (and not by the potential population).	The definition triggering reimbursement is coherent with CO36. This should make it easier for Member States and programme authorities to use this indicator consistently. Moreover, this indicator should make the operation appealing to beneficiaries, as payment is not tied to the final use (which might be perceived as too risky).	The indicator measures use of the new ICT system/service. There are no risks of favouring more densely populated areas, since payment is triggered by use of the service (and not by the potential population).
Cons	It implies an ex-ante definition of technical standards linked to the	The indicator measures the 'population of a certain area	The main risk is that the operation may not appeal to beneficiaries,

Option 1	Option 2	Option 3
lump sum. In our case, a lump sum would imply defining the technical requirements of a standard type of health information system/e-service.	expected to benefit from the health service supported by the project'. This means reimbursement would not be triggered by the number of people who use the improved service but by the number of people potentially benefiting from it. Payment is not linked to the actual but to the potential benefit. This risks allowing ineffective projects (in terms of increased use of ICT solutions) to be reimbursed and risks favouring beneficiaries from densely populated areas such as hospitals in large cities over hospitals in inland/remote areas.	as they might view payment tied to final users as too risky. The second risk is connected to the type of indicator used, which lacks an official definition by the EC. The risk of inconsistent use by Member States and programme authorities is therefore higher. To limit this risk, methodological guidelines are needed to define standard characteristics of the indicator.

Source: Consortium

Selection among these three options was influenced by the risk factors highlighted in the previous table.

Option 1 was discarded because of the high average cost associated with individual services/systems. In certain countries, this exceeded EUR one million, making it risky to provide a lump sum without defining milestones and minimum technical standards.

The decision between options 2 and 3 was guided by risk minimisation. Option 3 was deemed too risky due to the operation being potentially unattractive for beneficiaries. This ties the payment to actual usage, which can be influenced by external factors beyond the control of the public actor. These operations involve significant costs (over EUR one million in many countries), subjecting substantial investments to the risk of non-reimbursement if final users do not utilise the services. Recent crises, such as the Covid pandemic and the war in Ukraine, have highlighted the importance of planning while considering the risks associated with external factors.

In the end, option 2 was chosen as it seemed to strike the best balance between advantages and disadvantages.

Definition of the SCO

The proposed SCO will reflect costs associated with developing a new e-health service. This includes both new digital primary care services and new electronic healthcare information systems. The intended beneficiaries are hospitals, public bodies issuing health services and health institutions.

To be eligible for reimbursement, managing authorities must provide evidence in their audit trail indicating the population expected to benefit from the new e-health service supported by the project.

Assessment of data

The historical (base) data was collected directly from managing authorities and intermediate bodies using a standardised data collection form. The data relates to verified expenditure that comes directly from ERDF/CF.

For sub-areas 1.1 and 1.2, data from three Member States (ES, MT, PT) were used to calculate the SCO rate for a set of activities/costs:

- Purchase, installation, and maintenance of IT equipment

- Purchase, installation, update and upsize of software

- Software licensing

- Technical development

- Staff costs, provision of training

- Technical assistance consultancy

- Digital provider costs

For the remaining 24 Member States, the unit cost was extrapolated from the sample.

Calculation method

Step 1. The initial data analysis involves **excluding records** that fall under two categories: a) projects that are either ongoing or considered irrelevant for the measure, and b) projects lacking information on both verified total costs and verified values related to CO36 or similar indicators (i.e. indicators consistent with CO 36). Following this initial filter, the sample of countries with relevant data was reduced to only four: EL, ES, MT, PT.

The majority of records provided by Member States were excluded because they lacked essential information on verified values concerning CO36 or similar indicators. This was observed in the data provided by BE, CZ, DE, FI, FR, IT, LT, NL, RO and SI.

For the CO36 indicator, it is important to underline that:

- For ES, the calculation relies on operations monitored by the National Specific Indicator 'E019 Población beneficiada por servicios digitales de gestión patologías crónicas u otros servicios específicos en al área de e-salud, envejecimiento activo y saludable'. Clarifications requested from the managing authorities helped confirm alignment with common indicator CO36. Both CO36 and the national indicator EO19 assess the population potentially benefiting from the new service/system rather than measuring actual users.

- For PT, the calculation relies on the indicator 'População servida pela operação'. As for ES, clarifications requested from the managing authorities confirmed alignment with CO36.

Some projects monitored using CO36 (or similar) were associated with interventions developing multiple health information systems/e-services. For greater homogeneity and consistency in the reference database, it was decided to investigate the cost of a single ICT system/service for the population potentially covered by the system/service.

Step 2 involved **identifying and removing outliers from data provided by Member States** (EL, ES, MT, PT) that offered all the necessary information. The limited number of records constrains the interquartile analysis which is augmented by a qualitative assessment based on expert judgment. For Member States with fewer than two relevant records (such as EL), it was not possible to analyse the outliers. As such, these Member

States required the SCO to be extrapolated through statistical sources (as outlined in Step 5).

Table 10 – 1.1 and 1.2: availability of historical data and no. of outliers

MS	Relevant data on completed projects with info on CO36 (or similar indicators)	No. of outliers
EL	1	n/a
ES	8	2
MT	3	1
PT	10	0

Source: Consortium

Step 3 involved **calculating the total SCO for the three Member States** (ES, MT, PT) that provided all the necessary data. We calculated the average ratio between the total verified costs and the total population potentially covered by the new system/service. This was based on the database that has been cleared of any outliers.

Step 4 involved **adjusting the established rates to account for inflation**. Since the rates were based on historical data from 2014-2020, the estimates in Step 3 needed to be updated to reflect current prices in 2023. Proxy rates were indexed based on the average cumulative inflation of the Harmonised Indices of Consumer Prices for 2018 to 2022 (i.e. HICP in Industrial Goods, Services and Communication - Eurostat, PRC_HICP_AIND - Annual average rate of change).

Step 5 involved **extrapolating rates for the remaining 24 Member States.** To do so, the rates for the total cost of interventions were determined through linear regression. Here the average cost per inhabitant in each Member State is a dependent variable and the standardised average of the following independent statistical indicators is an explanatory factor:

● Labour cost for LCI (compensation of employees plus taxes minus subsidies) in Information and Communication and Professional, Scientific and Technical Activities (EU27_2020 = 100) (Eurostat, LC_LCI_LEV);

● Price level index for Communication, Machinery and Equipment, and Software (EU27_2020 = 1) (Eurostat, PRC_PPP_IND)

Rates

In the table below the calculated rates can be found. Historical (base) data were highlighted in grey.

Table 11 –SCO rates sub-areas 1.1/1.2 (Euros)

MS	Rates
BE	1.03
BG	0.78
CZ	0.85
DK	1.02
DE	0.99
EE	0.83
IE	0.99
EL	0.85
ES	0.96
FR	0.98
HR	0.80
IT	0.91
CY	0.85
LV	0.81
LT	0.80
LU	1.04
HU	0.80
MT	0.76
NL	1.00
AT	0.99
PL	0.77
PT	0.89
RO	0.75
SI	0.88
SK	0.83
FI	0.95
SE	1.02

Source: Consortium

Summary table

Table 12 – Summary table sub-areas 1.1/1.2

Definition of the SCO	This SCO would cover the cost per inhabitant expected to benefit from the new e-health service
Eligible activities	Purchase, installation, and maintenance of IT equipment Purchase, installation, update and upsize of software Software licensing Technical development Staff costs, provision of training Technical assistance consultancy Digital provider cost
Target beneficiaries	Hospitals, public bodies issuing health services and health institutions
Indicator name and definition	CO 36 Population covered by improved health services Population of a certain area expected to benefit from the e-health services supported by the project.
Measurement unit	Number of inhabitants expected to benefit from the new e-health service
Base calculation formula	$SCO = \dfrac{C_{total}}{n.inhabitants}$, where *n.inhabitants* is the total number of inhabitants expected to benefit from the new e-health service C_{total} is total costs of the operation, in EUR
Eligible costs	All eligible costs of the operation
Arrangements for the audit trail	Documents (reports, certificates) providing evidence that the new e-health system is operational and suitable to serve a specific number of inhabitants.
Key risks/limitations and measures to prevent perverse incentives	*Risk/limitation*: Risk of allowing ineffective projects (increased use of ICT solutions) to be reimbursed and risk favouring beneficiaries from densely populated areas.	*Mitigation measure:* The selection procedure should aim to award only projects with clear added value, also taking into account the need of not discriminating less densely populated areas.
Method for regular adjustment of the rates	***Adjusted SCO = SCO * (1 + (Inflation Rate / 100)),*** where the Inflation Rate is the Harmonised index of consumer prices (HICP): average of Industrial Goods, Services and Communication (Eurostat, PRC_HICP_AIND). Annual average rate of change.	

Source: Consortium

2.1.2. Sub-area 1.3: Purchase of personal protective equipment necessary to address emergency situations

For sub-area 1.3, data was collected from 14 Member States: DE, EE, ES, FR, HR, IE, IT, LT, MT, PL, PT, SK, RO, SI. The data is very different in terms of the costs covered. This is particularly notable with over 300 types of medical devices in the database.

To address the diversity of data gathered from Member States, we chose to take the following steps:

Step 1. Narrowing the selection of medical devices for the study.

In 2020, the European Centre for Disease Prevention and Control (ECDC) issued a technical report to assist planning for public health preparedness. This report focused on identifying necessary PPE where patients were suspected or confirmed to have COVID 19. We have adopted it to determine the PPE to be included in the study (see table below).

Table 13 – List of pertinent PPE items for the study, from the minimum outlined by ECDC in 2020

Type of protection	Pertinent PPE
Respiratory protection	FFP2 or FFP3 respirator
Eye protection	Goggles or face shield
Body protection	Long-sleeved water-resistant gown
Hand protection	Gloves

Source: Consortium

Step 2. Treat PPE requirements for patients suspected or confirmed to be infected with the coronavirus as the baseline for any viral syndromes.

SCO Definition

The SCO proposed covering the costs for PPE during hospitalisation of patients with viral syndromes (i.e. unit cost per day per patient).

To be eligible for reimbursement, managing authorities must furnish evidence of the number of days of hospitalisation for each patient.

Assessment of data

The historical (base) data was collected directly from managing authorities and intermediate bodies using a standardised data collection form. The data collected from Member States relies on verified expenditure directly from ERDF/CF.

For sub-area 1.3, data from 6 Member States (ES, FR, IT, PL, SK, and RO) were used to calculate the SCO rate referring to the following medical devices:

- respiratory protection (FFP2 or FFP3 respirator);

- eye protection (goggles or face shield);

- body protection (long-sleeved water-resistant gown);

- hand protection (gloves).

These 6 Member States were selected because they were the only ones that provided data for relevant items (i.e., respiratory, eye, hand, and body protection items) and were also able to provide the number of PPE acquired divided per typology of the item. This information was indeed necessary to calculate the unit cost of each piece of equipment.

As shown in the table below, historical data is available for each of the four categories of medical devices: four Member States for respiratory protection, eye protection and hand protection, five for body protection PPE. These data were used to extrapolate the cost for any Member State that did not provide the data, following the method outlined in the next paragraphs.

Table 14 – Historical data for the four categories of medical devices

MS	Respiratory protection	Eye protection	Body protection	Hand protection
ES	1	0	1	1
FR	0	2	0	0
IT	1	1	1	1
PL	0	2	5	7
SK	3	0	3	0
RO	8	79	74	130

Source: Consortium

Calculation method

Step 1 involved **identifying and removing outliers from the data provided by Member States** (ES, FR, IT, PL, SK and RO). The restricted quantity of records constrains the interquartile analysis, so we used a qualitative assessment based on expert judgment. The table below details the number of outliers for each Member State.

Table 15 – No. of outliers for the four categories of medical devices

MS	Respiratory protection	Eye protection	Body protection	Hand protection
ES	n.a	n.a	n.a	n.a
FR	n.a	n.a	n.a	n.a
IT	n.a	n.a	n.a	n.a

MS	Respiratory protection	Eye protection	Body protection	Hand protection
PL	n.a	n.a	0	0
SK	1	n.a	n.a.	2
RO	2	2	1	33

Source: Consortium

Step 2 involved **calculating unit cost for the six Member States** (ES, FR, IT, PL, SK and RO) that provided the data. For each category of medical device, we calculated the average of total costs to the number of medical devices purchased, based on data cleared of any outliers. This calculation identified 4 unit costs for respiratory protection PPE (ES, IT, SK and RO), 4 for eye protection (FR, IT, PL and RO); 5 for body protection (ES, IT, PL, SK and RO) and 4 for hand protection (ES, IT, PL and RO).

Step 3 involved **adjusting the rates for inflation**. As the rates were primarily derived from operations concluded in 2020, the unit costs calculated in Step 3 needed revising to present-day values in 2023. The unit costs were adjusted in line with average cumulative inflation in the Harmonised Indices of Consumer Prices for Health for 2020 to 2022.

Step 4 involved **extrapolating rates for Member States** that did not provide data**.** The rates of each type of medical device were determined through linear regression. The health care expenditure by function in 2020 was used as the independent (predictor) variable.

Step 5 involved **calculating two SCO for each Member State,** in the following process:

- The cost of a set of medical devices is the sum of unit costs for (i) respiratory protection, (ii) eye protection, (iii) body protection, and (iv) hand protection.

- The unit cost per day per hospitalised patient multiplies the cost of a set of medical devices by 19. This factor, 19, is the average between the 14 sets needed for a patient with mild symptoms and 24 sets for a severe symptoms case according to the ECDC report (refer to the table below).

Table 16 – No. of sets considered to calculate the unit cost

	No. of sets per the ECDC report	Average used to calculate the SCO
Per day per hospitalised patient with mild symptoms	14-15	19
Per day per hospitalised patient with severe symptoms	15-24	

Source: Consortium based on the ECDC report

Rates

Table 17 – SCOs rates sub-area 1.3 (Euros)

MS	Rates
AT	320
BE	306
BG	185
CY	228
CZ	221
DE	330
DK	345
EE	212
EL	209
ES	241
FI	296
FR	281
HR	192
HU	194
IE	334
IT	272
LT	204
LU	353
LV	198
MT	250
NL	327
PL	214
PT	228
RO	142
SE	332

MS	Rates
SI	230
SK	215

Source: Consortium

Summary table

Table 18 – Summary sub-area 1.3

Definition of the SCO	The SCO covers the costs for PPE needed during hospitalisation of patients with viral syndromes
Eligible activities	Respiratory protection Eye protection Body protection Hand protection
Target beneficiaries	Hospitals, public bodies issuing health services and health institutions
Indicator name	Days of hospitalisation per patient
Measurement unit for the indicator	Number of days of hospitalisation per patient
Base calculation formula	$\left(\frac{CtEye}{NtEye} + \frac{CtBody}{NtBody} + \frac{CtResp}{NtResp} + \frac{CtHand}{NtHand}\right) \times NdSet$, where *CtEye* is the total cost of the eye protection items in EUR *NtEye* is the total number of the eye protection items *CtBody* is the total cost of the body protection items in EUR *NtBody* is the total number of the body protection items *CtResp* is the total cost of the respiratory protection items in EUR *NtResp* is the total number of the respiratory protection items *CtHand* is the total cost of the hand protection items in EUR *NtHand* is the total number of the hand protection items *NdSet* is the number of sets needed per day per patient hospitalisation (19)
Eligible costs	Costs of PPE
Arrangements for the audit trail	Certificates providing evidence of the number of days of hospitalisation for each patient.

Definition of the SCO	The SCO covers the costs for PPE needed during hospitalisation of patients with viral syndromes	
Key risks/limitations and measures to prevent perverse incentives	*Risk/limitation:* Risk of using low-quality PPE.	*Mitigation measure:* The selection procedure should refer to specific quality standards.
Method for regular adjustment of the rates	***Adjusted SCO = SCO * (1 + (Inflation Rate / 100),*** where the Inflation Rate is the Harmonised index of consumer prices (HICP): average of Industrial Goods and Services (Eurostat, PRC_HICP_AIND). Annual average rate of change.	

Source: Consortium

2.2. Area 2: ICT

This section provides proposed SCOs in the policy area of ICT.

The EU approach towards a digitalised economy and society prioritises solidarity, prosperity and sustainability while empowering citizens and businesses. Adoption of digital technologies can improve services and products as well as increase competitiveness. The COVID-19 crisis proved that digitalisation is crucial to improving the economic resilience of businesses, especially SMEs. Digital tools offer firms several benefits, including reducing transaction costs, improving information access, and facilitating communication. Moreover, SMEs can integrate in the global market more easily and access more resources.

On the other hand, the public sector is facing ever-increasing demands from digital tech, with e-government aiming for efficiency, savings, transparency and accessibility by 2030. Digitalisation can transform citizen-administration interactions, which need more interoperability and improvements across all government levels and services.

Despite the benefits and opportunities of digital technologies and the significant up-take in recent years, many SMEs and public administrations continue to lag behind. The digital adoption gap between smaller SMEs and their larger counterparts has widened notably in the past decade. Similarly, many digital public services still offer only basic functions. To fully exploit the potential of digitalisation it is important to continue investing in and promoting the digital transformation of SMEs and public administration.

For this, the study covered the following sub-areas:

- 2.1 Promotion of e-services for SMEs;

- 2.2 Raising the digital security profile of SMEs;

- 2.3 Development of inter-connection registers with a view of implementing the once-only principle;

- 2.4 Development of services to fulfil essential requirements of a life event;

- 2.5 Development of e-service application.

The data collected for sub-areas 2.1 and 2.2 on the digital transformation of SMEs, has been consolidated into a single chapter (section 0). These 2 sub-areas were merged, and the data used to develop a unique SCO covering both types of operations. The same was

also for sub-areas 2.3, 2.4 and 2.5 which were incorporated to cover all operations related to the digitalisation of public services (section 2.2.2). These decisions were based on a preliminary analysis of the results and feedback during data collection, as described in the previous chapter.

2.2.1. Sub-areas 2.1 and 2.2: Digital transformation of SMEs

In the initial phases of data collection, the procedures for sub-area 2.1 (Promoting e-services solutions for SMEs) and 2.2 (Raising the digital security profile of SMEs, through investing in digital security measures) were conducted separately. Managing authorities were asked to provide data for each sub-area. However, after analysing the data and project details, it was evident that dividing projects into these two sub-areas presented challenges.

A comprehensive analysis of both sub-areas revealed a significant convergence. This was observable in the activities and the primary output indicator used to assess digital security operations and the promotion of e-service solutions for SMEs.

Furthermore, numerous projects in the dataset considered promotion of e-service solutions for SMEs (sub-area 2.1) and digital security (sub-area 2.2) as part of a broader digitalisation program. As a result, separating these activities was challenging as they were interconnected, contributing collectively to the digital transformation of SMEs. This complementarity was evident in countries such as Germany and Belgium, where managing authorities had difficulties in providing precise data for sub-area 2.2, given the inherent interdependence with more comprehensive SME-focused projects.

Additionally, although nine Member States (BG, CZ, DE, ES, FI, IT, PL, PT and RO) submitted information on projects regarding sub-area 2.2, only five of them (BG, DE, ES, IT and PL) furnished simultaneous data on total costs and the predominant output indicator. Among these, only three Member States (BG, ES and PL) provided a cost breakdown per activity (total or partial). Therefore, useful data for this sub-area was very limited.

In light of these considerations, the study team concluded that the best strategy was to integrate sub-areas 2.1 and 2.2. This strategic merger addressed the overlap of activities and indicators within both sub-areas. Furthermore, it mitigated the scarcity of data on digital security that could otherwise impede the development of a SCO for sub-area 2.2. Likewise, this integration increased the sample size, improving the precision of estimates for Member States with incomplete data.

Based on the initial assessment of historical data, the study team evaluated the following SCO options:

Lump sum for SMEs completing digital transformation activities. This was based on data provided by Member States for the indicator 'Number of firms receiving grants', the most common indicator in both sub-areas. This SCO would require the fulfilment of a selected set of mandatory activities, specifically those that represent the most significant expenses, as evidenced in the historical data. This option was selected for full development.

Table 19 lists the pros and cons of the proposed option.

Table 19 – Pros and cons of the option

Lump sum for SME digital transformation activities
Pros	• Data is sufficient for a sample covering activities in almost a third of Member States;

Lump sum for SME digital transformation activities	
	- Synergetic for sub-areas 2.1 and 2.2 and could be used to reimburse expenditure on activities covered by both sub-areas; - A lump sum would provide flexibility for activities which could be reimbursed and would not be too prescriptive, increasing its attractiveness and potentially enabling higher uptake of the SCO; - Having a minimum list of mandatory activities would reduce the risk of slicing of operations caused by SMEs breaking down the lump sum into smaller and less effective initiatives rather than focusing on more comprehensive activities.
Cons	- Statistical methods such as extrapolation is needed to come up with estimates of the lump sum amount for Member States not covered by the historical data sample; - Cost item weights may vary relative to total costs in different Member States. This implies the need to homogenise values across Member States, which may reduce the accuracy of SCO amounts; - Member States that have historically not performed all the required mandatory activities may find this SCO unappealing, as eligibility for the lump sum depends on not repeating their past behaviour of skipping these activities.

Source: Consortium

Lump sum for one e-service created, was also assessed. However, subsequent data analysis led the study team to conclude that this approach was unviable to formulate a standardised SCO. This was due to constraints from data availability and quality, coupled with the inadequacy of the indicator (number of e-services created) to capture outputs of activities under sub-area 2.2.

The study team does not propose any SCOs based on reimbursement through unit costs. This stems from the absence of indicators capable of quantifying tangible inputs, outputs or results directly linked to activities such as cost per user or cost per month of running an e-service. Hence, reimbursement options are limited to being contingent either upon the completion of predefined activities or the full achievement of direct outputs. Additionally, some costs attributed to sub-areas 2.1 and 2.2 rely on one-off purchases or foreseeable expenditures. These include costs related to application setup, establishing a domain, server and cloud services, purchasing and installing hardware and software, as well as personnel, consultancy and training costs. Hence, the study team perceives a lump-sum reimbursement as the most suitable for these operations.

Definition of the SCO

The proposed SCO for sub-areas 2.1 and 2.2 is a **Lump sum for SME completing digital transformation activities**. Within this framework, the term 'digital transformation' includes promoting e-services for SMEs (sub-area 2.1) and raising SME digital security profiles (sub-area 2.2). This SCO is based on data provided by Member States, using the indicator **Number of firms receiving grants**, adopted by eleven Member States in sub-areas 2.1 and 2.2 (BG, CY, CZ, DE, ES, FR, EL, HR, IT, MT and PL).

The Lump sum is calculated based on the following activities:

- Set up and maintenance of applications;

- Domain, server and/or cloud services to implement activities;

- Hardware and software (e.g., purchasing, installation, update, maintenance and licensing);

- Staff and external consulting;

- Training.

Assessment of data

The data was collected directly from managing authorities and intermediate bodies using a standardised and structured data collection form. The forms asked the managing authorities and intermediate bodies to provide information on: funding source; type of operation; any regional or national SCO in the area; reference information (i.e., project number, title, period of calls/projects, eligibility rules); supported activities; costs; results and/or outputs; and any additional information as comments or clarifications.

For finalised projects, 16 Member States provided qualitative information on eligible costs.[8] Among countries that provided information on sub-areas 2.1 and 2.2, 15 not only shared qualitative information on eligible costs but also, to a varying extent, specified the costs per activity for at least one completed project. Most costs were associated with activities distinctive to each Member State, highlighting significant variations across the Member States. To partially mitigate potential challenges from this diversity, the study categorised cost components into:

- Set up and maintenance of applications;

- Domain, server and/or cloud services to implement activities;

- Hardware and software;

- Staff and external consulting;

- Training.

The approach to monitoring outputs and results differed greatly by Member State, with more than 40 outputs. Despite this divergence, specific indicators were adopted by multiple Member States. The most common was the **number of firms receiving grants**, monitored by eleven Member States that provided data on sub-areas 2.1 and 2.2.

For Member States that did not provide data on costs per activity or on the outcome indicator, the amounts were extrapolated based on the sample, as explained below.

Calculation method

This section explains the statistical method and indicators used to develop EU-level SCO values for Member States with incomplete or absent historical data. It also explains the data refinement approach undertaken by the study team for sub-areas 2.1 and 2.2.

Step 1: Data refinement

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[8] For more information on the data quality assessment, please refer to Annex 3.

Refining the data involved merging the data collection forms received from Member States. Then, the raw average costs for the outcome-based indicator at the activity level were computed. Outliers were removed to ensure robustness and reliability for SCO calculations. Values that exceeded 1.5 times or were less than 0.5 times the Member State's average for each activity were considered outliers and removed.

At this stage, the study team conducted an in-depth analysis of the values provided by OPs. By applying expert judgment, outliers were meticulously evaluated for exclusion or retention to comply with the socioeconomic logic. For instance, values that were disproportionately large or small compared to other Member States were removed. Values previously flagged as outliers were manually reintroduced if they were consistent with observations from other Member States or the Member State had only a few observations (which makes the automatic detection of outliers less efficient). This step enhanced the comparability of averages across Member States.

Step 2: Estimated amounts

Firstly, the study team computed the average cost for each activity (application; domain, server and cloud; hardware and software; staff and external consulting; and training) per firm awarded a grant. This included all Member States that provided the required data. To ensure consistency in historical data across various Member States and to address cases where data was partially or entirely unavailable, we employed statistical inference methods to estimate values for all Member States.[9] The extrapolation is based on univariate linear regression, where the average cost per firm in each Member State is a dependent variable and the average of the following statistical indicators is an explanatory factor:

- Labour cost for LCI (compensation of employees plus taxes minus subsidies) in Information and Communication and Professional, Scientific and Technical Activities (EU27_2020 = 100) (Eurostat, LC_LCI_LEV);

- Price level index for Communication, Machinery and Equipment, and Software (EU27_2020 = 1) (Eurostat, PRC_PPP_IND).[10]

These indicators assess the divergence between Member States for labour costs and prices, which impact the cost of economic activities related to sub-areas 2.1 and 2.2. Therefore, they are deemed a relevant predictor to fill in the missing values for Member States where data was either partially available or completely absent.

The study team adopted a consistent methodology for all five activities, with a slightly nuanced approach for Hardware and Software. Given substantial variances in the data, Hardware and Software projects were not comparable across Member States. Costs for this activity varied from a few thousand euros by 'low-spenders' like CY and MT, to more than a hundred thousand euros by 'high-spenders' like CZ, FR and PL. This wide range of values made it challenging to establish a standard baseline for extrapolation and to identify outliers among the Member States. Disregarding Hardware and Software in the calculation was impracticable, given the importance of such costs in operations under sub-areas 2.1 and 2.2. Costs linked to this category accounted for more than half of the total costs of the sample.

To address the considerable cost variations in Hardware and Software activities, the study team modified the extrapolation strategy to homogenise values for this activity. This revised approach involved removing particularly expensive projects from high-spending Member

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[9] To avoid biasing results from the extrapolation, the historical values used as inputs are similar across Member States. Member States considered as 'outliers' (i.e., with very high or very low values) are removed from the estimation.

[10] An exception was made for Greece, whose price level index was adjusted by removing 'communication', since the higher values for this activity skewed the extrapolation.

States, i.e., projects in these countries whose costs exceed the EU average for this activity. By doing so, the team aimed to generate more balanced predictions, preventing the distortion of predicted values by overly expensive projects, which could lead to overcompensation. Similarly, to ensure the predictions were not skewed towards less expensive projects, Member States with notably low expenses were also excluded from the extrapolation process.

Step 3: Inflation adjustment

Estimates of amounts for each activity per Member State were based on nominal values from past interventions. Subsequently, the amounts were revised to align with 2023 prices.

The amounts were updated using statistical indicators from Eurostat, to consider inflation relevant to activities within sub-areas 2.1 and 2.2.

- Labour cost index in Information and Communication and Professional, Scientific and Technical activities (Eurostat, LC_LCI_R2_A). Percentage change compared to previous year.

- Harmonised index of consumer prices (HICP) in Industrial Goods, Services and Communication (Eurostat, PRC_HICP_AIND). Annual average rate of change.

The proposed indicators were considered relevant to adjust the values in both sub-areas as they consider labour prices in selected sectors for each Member State as well as consumer price inflation within the European Union.

Rates

Table 20 presents the proposed SCOs for sub-areas 2.1 and 2.2 combined. The amounts have been estimated for all Member States, based on historical data for five specific activities: set up and maintenance of applications; hardware and software; staff and external consulting; domain, server and/or cloud services for the implementation of activities; and training.

In this proposed approach, only the first three activities – set up and maintenance of applications, hardware and software, and staff and external consulting – should be considered mandatory. This decision is intended to increase flexibility and encourage wider use of SCOs, given that, historically, these three activities constitute over 90% of total costs in digital transformation activities. This approach is also intended to avoid a potential slicing of operations and ensure that SCOs accurately reflect real costs, as the mandatory activities comprise the majority of the historical data used to calculate these amounts.

Table 20 – SCOs for sub-areas 2.1/2.2 (Euros)

MS	Lump sum per SME
AT	74 295
BE	79 730
BG	62 384

MS	Lump sum per SME
CY	60 166
CZ	66 684
DE	75 864
DK	74 890
EE	67 045
EL	63 611
ES	60 708
FI	66 935
FR	70 952
HR	56 600
HU	64 182
IE	77 452
IT	61 850
LT	70 425
LU	79 660
LV	66 637
MT	60 695
NL	75 663
PL	61 077
PT	62 282
RO	62 091
SE	77 156
SI	64 971
SK	64 724

Source: Consortium

Summary table

Table 21 – Summary for sub-areas 2.1/2.2

Definition of the SCO	This SCO would cover the cost of one SME receiving a grant to complete selected digital transformation activities.
Eligible activities	The term 'digital transformation' includes promoting e-services for SMEs (sub-area 2.1) and raising SME digital security profiles (sub-area 2.2). It should cover, as a minimum, the following activities: ● Set up and maintenance of applications; ● Hardware and software; ● Staff and external consulting.
Target beneficiaries	Small (from 10 to 49 employees) and medium (from 50 to 249 employees) enterprises.
Indicator name	SME receiving grant conditional to completion of digital transformation activities.
Measurement unit for the indicator	Number of SMEs receiving grants for the completion of digital transformation activities.
Base calculation formula	$SCO = \sum_{i=1}^{5} \frac{Ctotal_{activity\,i}}{nGrants}$, where i = 1 corresponds to set up and maintenance of applications; i = 2 corresponds to domain, server and/or cloud services for the implementation of activities; i = 3 corresponds to hardware and software, i = 4 corresponds to staff and external consulting; and i = 5 corresponds to training. Ctotal is the sum of total costs of activity i, in EUR. nGrants is the sum of the output indicator (i.e., the number of firms receiving grants to perform SME digital transformation activities).
Eligible costs	All eligible costs of the operation
Audit trail	<u>Proof of eligibility of the beneficiary:</u> HR documents of the SME, such as annual reports, confirming the size of the company is within the definition of an SME. <u>Proof that activities took place and projects outcomes are verifiable and real:</u> Certificate of service completion, denoting the completed activities and signed by beneficiary and service provider.

	Risk/limitation 1 Beneficiaries may aim to minimise their expenditure towards fulfilling the	Mitigation measure The selection procedure should aim to award only projects with clear added value.

	condition while undertaking a low-value project.	
	Risk/limitation 2 There is a risk of beneficiaries breaking down the lump sum into smaller, less effective initiatives rather than focusing on more comprehensive (and potentially more impactful) digital transformation activities (i.e., slicing of operations).	Mitigation measure By setting a minimum list of mandatory activities, it becomes more difficult for beneficiaries to oversimplify activities, reducing the risk of slicing of operations.
Method for regular adjustment of the rates	***Adjusted SCO = SCO * (1 + (Inflation Rate / 100)),*** where the inflation rate is the harmonised index of consumer prices (HICP): average of Industrial Goods, Services and Communication (Eurostat, PRC_HICP_AIND). Annual average rate of change.	

Source: Consortium

2.2.2.   Sub-areas 2.3, 2.4 and 2.5: Digitalisation of public services

Data collection for these three sub-areas was initially carried out separately, with managing authorities asked to provide distinct data for each measure. However, after reviewing the data and examining project information, it was clear that assigning projects to one specific sub-area posed challenges. In particular, sub-areas 2.3 and 2.4 covered highly specific types of operations that could easily fall within the broader scope of sub-area 2.5 'Development of e-service applications'. Furthermore, the limited records for these 2 sub-areas was an additional argument for this decision. These 2 issues were particularly evident in sub-area 2.4.

Some examples of projects provided under sub-area 2.3 and 2.4 which could be categorised as sub-area 2.5 are provided below:

- New IT era in Nowa Sól info-service package for residents (2.4, PL)

- Citizen's portal and communication with the office via the internet (2.4, CZ)

- Development of the electronic waybill subsystem (2.4, LT)

- A service platform and card to allocate aid to young people in midi-pyrenees (2.4, FR)

- Single Payroll Digital Services (2.3, EL)

- Program of projects e-space (2.3 SI)

Moreover, for sub-area 2.3, many Member States have implemented umbrella projects that encompass activities covering both sub-areas. The purpose of these operations is to integrate different functionalities and provide more efficient e-services to citizens. As a

result, separating these activities is challenging as they are interconnected. Examples of such umbrella projects include:

- Unified Entrepreneurs Desk City of Antwerp (BE)

- Implementation of authentication with citizen card and mobile digital key (PT)

- Customs Code of the Union - electronification of customs procedures (CZ)

These examples demonstrate the complexity of categorising digital public sector projects.

As for sub-areas 1.1 and 1.2 (see section 2.1.1) three SCOs were considered for these sub-areas merged under Area 1:

- **Option 1:** Lump sum per e-governance system/service created

- **Option 2:** Unit cost per population (no. of inhabitants) covered by improved e-governance system/service

- **Option 3:** Unit cost per no. of users of new e-governance system/service

The rationale behind these options was to build on a common/widely used and, preferably, result-based indicator. This simplifies the task for Member States when it comes to measuring and reporting their results in future. The definitions of proposed SCO alternatives are presented in the table below.

Table 22 – Possible unit costs for sub-areas 2.3, 2.4 and 2.5: pros and cons of three options

	Option 1	Option 2	Option 3
	Lump sum per e-governance system/service created	**Unit cost per population (inhabitants) covered by improved e-governance system/service**	**Unit cost per no. of users of new e-governance system/service**
Pros	The indicator has been adopted by most Member States and covering most projects. The indicator measures use of the new ICT system/service. There are no risks of favouring more densely populated areas, since payment is triggered by use of the service (and not by the potential population).	This indicator should make the operation appealing to beneficiaries, as payment is not tied to final use (which might be perceived as too risky).	The indicator measures actual use of the new ICT system/ service. There are no risks of favouring more densely populated areas, since payment is triggered by use of the service (not by the potential population).
Cons	It implies an ex-ante definition of technical standards linked to the lump sum. In our case, use of lump sum would imply defining the technical requirements for a standard type of e-governance system/ service. It tends to lead to binary situations of payment or	The indicator measures the 'population of a certain area expected to benefit from the improved e-governance system/service'. This means reimbursement would not be triggered by the number of people who have used the improved service but by the number of people potentially affected by improved service. So, payment is not linked to the actual but to the potential benefit. This risks allowing ineffective projects (in terms of increased use of ICT solutions) to be reimbursed and also risks favouring beneficiaries from densely populated areas	The main risk is that the operation may not appeal to beneficiaries, as they might view the payment tied to the final users as too risky. The second risk is connected to the indicator, which lacks any official EC definition. The risk of inconsistent use by Member States and programme authorities is therefore higher. Limiting this risk requires methodological guidelines that

Option 1	Option 2	Option 3
no payment depending on full achievement.	such as hospitals in large cities over hospitals in inland/remote areas. The second risk is connected to the type of indicator, which lacks any official EC definition. The risk of inconsistent use by Member States and programme authorities is therefore higher. Limiting this risk requires methodological guidelines that define the indicator characteristics.	define the indicator characteristics.

Source: Consortium

The selection from these three options was influenced by the risk factors highlighted in the previous table.

Option 1 was discarded because of the high average cost for individual services/systems. In certain countries, the figures exceeded one million euros, making it risky to provide a lump sum without defining milestones and technical standards.

The decision between options 2 and 3 was guided risk minimisation. Option 3 was deemed too risky due to the operation potentially being unattractive for beneficiaries. This ties payment to actual usage, which can be influenced by external factors beyond the control of the public actor. Since these operations involve significant costs (exceeding one million euros in many countries), substantial investments may not be non-reimbursed if the services are not used. Recent crises, such as the Covid pandemic and the war in Ukraine, have highlighted the importance of considering risks associated with external factors.

Option 2 seems to strike the best balance between advantages and disadvantages.

Definition of the SCO

The proposed SCO will encompass the costs of developing a new e-governance system/service. This includes development of inter-connection registers to implement the once-only principle, services to fulfil essential requirements of a life event and e-service applications.

The intended beneficiaries are public entities (local and regional authorities, national public bodies and institutions).

To be eligible for reimbursement, managing authorities must furnish evidence in their audit trail of the number of people expected to benefit from the new e-governance system/service.

Assessment of data

The historical (base) data was collected directly from managing authorities and intermediate bodies using a standardised data collection form. The data is based on verified expenditure directly from ERDF/CF.

For sub-areas 2.3, 2.4 and 2.5, data from three Member States (BE, IT, MT) were used to calculate the SCO rate referring to:

- Setting up and maintaining applications

- Purchase, installation, and maintenance of IT equipment

- Purchase, installation, update and upsize of software

- Network equipment for broadband internet

- Subscription-based costs/licenses

- Consultancy services

- Publicity costs

- Training costs

- Project management costs

- Overheads

For the remaining 24 Member States, the unit cost was extrapolated from the sample.

Calculation method

Step 1. The initial data analysis involved **excluding records** that were: a) ongoing or irrelevant projects, and b) projects lacking information on verified costs and values related to the indicator measuring the population covered by the intervention. As a result of this initial filter, only five countires had relevant data: BE, IT, LT, MT and PL.

The majority of records provided by Member States were excluded because they lacked essential information on verified values concerning the number of people covered by the improved system/service. This was observed in the data from CZ, EE, EL, ES, FI, FR, PT, RO SI.

Step 2 involved **identifying and removing outliers from the data provided by Member States** (BE, PL, IT, LT and MT) that provided all the necessary information. The lack of records constrained the interquartile analysis and was augmented by a qualitative assessment based on expert judgment. It was not possible to analyse the outliers from Member States with fewer than two records (such as PL and LT). These Member States required an SCO extrapolated through statistical sources (as outlined in Step 5).

Table 23 – 2.3, 2.4 and 2.5: availability of data and no. of outliers

MS	Relevant data on completed projects with info on population covered by the system/service	No. of outliers
BE	13	3
IT	16	2
LT	1	n/a
MT	7	3
PL	1	n/a

Source: Consortium

Step 3 involved **calculation of the total SCO for the three Member States** (BE, IT, MT) that provided all the necessary data. We calculated the average ratio between the total verified costs and the total population potentially covered by the new system/service. This calculation was based on the database cleared of outliers.

Step 4 involved **adjusting the established rates to account for inflation**. Since the rates were based on data from 2014-2020, the estimates in Step 3 needed to be updated to reflect 2023 prices. To achieve this, proxy rates were indexed based on the average inflation of the Harmonised Indices of Consumer Prices for 2018 to 2022 (HICP in Industrial Goods, Services and Communication - Eurostat, PRC_HICP_AIND - Annual average rate of change).

Step 5 involved **extrapolating rates for the remaining 24 Member States.** To do so, the rates for the total cost of interventions were determined by linear regression where the average cost per inhabitant in each Member State is treated as a dependent variable and the average of the following independent statistical indicators as an explanatory factor:

- Labour cost for LCI (compensation of employees plus taxes minus subsidies) in Information and Communication and Professional, Scientific and Technical Activities (EU27_2020 = 100) (Eurostat, LC_LCI_LEV);

- Price level index for Communication, Machinery and Equipment, and Software (EU27_2020 = 1) (Eurostat, PRC_PPP_IND)

Rates

In the table below the calculated rates can be found. Historical (base) data were highlighted in grey.

Table 24 – SCOs rates sub-area 2.3/2.4/2.5 (Euros)

MS	Rates
BE	1,22
BG	1,03
CZ	1,09
DK	1,23
DE	1,20
EE	1,08
IE	1,21
EL	1,09
ES	1,12
FR	1,20

MS	Rates
HR	1,05
IT	1,23
CY	1,09
LV	1,06
LT	1,05
LU	1,25
HU	1,05
MT	1,04
NL	1,21
AT	1,20
PL	1,03
PT	1,10
RO	1,01
SI	1,12
SK	1,08
FI	1,17
SE	1,23

Source: Consortium

Summary table

Table 25 – Summary tables sub-areas 2.3/2.4/2.5

Definition of the SCO	This SCO would cover the cost per inhabitant expected to benefit from the new e-governance service.
Eligible activities	Setting up and maintaining applications Purchase, installation, and maintenance of IT equipment Purchase, installation, update and upsize of software Network equipment for broadband internet

	Subscription-based costs/licenses
	Consultancy services
	Publicity costs
	Training costs
	Project management costs
	Overheads
Target beneficiaries	Public entities (local and regional authorities, national public bodies and institutions)
Indicator name	Population covered by improved e-governance service
	Population of a certain area expected to benefit from the e-governance service supported by the project.
Measurement unit for the indicator	Number of inhabitants expected to benefit from the new e-governance service
Base calculation formula	$SCO = \frac{C total}{n.inhabitants}$, where
	n.inhabitants is the total number of inhabitants expected to benefit from the new e-governance service
	C_{total} is total costs the operation, in EUR
Eligible costs	All eligible costs of the operation
Arrangements for the audit trail	Documents (reports, certificates) providing evidence that the new e-governance system is operational and is suitable to serve a specific number of inhabitants.

	Risk/limitation:	Mitigation measure:
Key risks/limitations and measures to prevent perverse incentives	Risk of allowing ineffective projects (increased use of ICT solutions) to be reimbursed and risk of favouring beneficiaries from densely populated areas.	The selection procedure should aim to award only projects with clear added value, also taking into account the need of not discriminating less densely populated areas.

Method for regular adjustment of the rates	**Adjusted SCO = SCO * (1 + (Inflation Rate / 100),** where the Inflation Rate is the Harmonised index of consumer prices (HICP): average of Industrial Goods, Services and Communication (Eurostat, PRC_HICP_AIND). Annual average rate of change.

Source: Consortium

2.3. Area 3: Environment

In recent years, Europe has faced unprecedented environmental challenges such as climate change and pollution, posing threats to biodiversity and resources. To combat these issues, the European Commission introduced the European Green Deal in late 2019, aiming for a greener trajectory and climate neutrality by 2050. Furthermore, the European Digital Strategy envisages a greener and more digital future, highlighting the pivotal role of a joint green and digital transformation, particularly in line with the European Green Deal's objectives.

In 2020, the COVID-19 pandemic heightened the urgency of nature preservation and restoration, underlining the interrelation between human health and ecosystem well-being. This stressed the necessity to transform the EU into a modern, resource-efficient and competitive economy. In this context, safeguarding water resources and biodiversity emerged as fundamental pillars of environmental protection in Europe. High-quality, safe drinking water is essential for daily life and sustenance, while protecting biodiversity and ecosystems is crucial for disease prevention and resilience. Investing in nature protection and restoration contributes to Europe's COVID-19 recovery, benefiting diverse economic sectors and ensuring food security.

For this purpose, the study covered the following sub-areas:

- 3.1 Developing digital solutions/applications to improve monitoring & management of drinking water sources

- 3.2 Constructing/modernising drinking water infrastructure

- 3.3 Installing green roofs.

2.3.1. Sub-area 3.1: Developing digital solutions/applications to improve monitoring and management of drinking water sources

For sub-area 3.1, we received data from nine Member States but only three (CZ, EL, PT) provided data on relevant and completed projects with data on total costs and at least one indicator. The approach for monitoring outputs and results differs across these three Member States and the only indicator used by two of them is 'no. of solutions created' used by CZ and EL. Using this indicator to structure an SCO would mean defining a lump sum. The considerations for sub-areas 1.1 and 1.2 and sub-areas 2.3, 2.4, 2.5 are also valid in this case - lump sums are not adapted to this type of operation as it is impossible to define technical standards. For this reason, in accordance with the EC we decided to not proceed with the elaboration of a SCO for this sub-area.

2.3.2. Sub-area 3.2: Constructing/modernising drinking water infrastructure

Definition of the SCO

The proposed SCO will cover costs for constructing/modernising drinking water infrastructure.

The intended beneficiaries are public entities (local and regional authorities, national public bodies, and institutions).

To be eligible for reimbursement, managing authorities must furnish evidence in their audit trail of the number of additional people served by improved water supply.

Assessment of data

The (base) data was collected directly from managing authorities and intermediate bodies using a standardised data collection form. The data from Member States relies on verified expenditure directly from ERDF/CF.

For sub-area 3.2, data from two Member States (EL and PL) were used to calculate the SCO rate referring to:

- Construction of water infrastructure

- Project management

- Preparatory work

- Overheads.

For the remaining 25 Member States that did not provide data the cost of the intervention was extrapolated from the available sample.

Calculation method

Step 1. The initial data analysis involved **excluding records** that were: a) ongoing or irrelevant projects and b) projects lacking information on verified total costs and indicator values measuring the additional population served by the intervention. As a result, the sample of countries with relevant data was reduced to only four: EL, ES, PL, SI.

The majority of the records provided by Member States were excluded because they were inconsistent with the definition of the measure proposed by the EC. This included data provided by HU, MT and PT.

Step 2 involved identifying and removing outliers from the data provided by Member States (EL, ES, PL, SI). The restricted quantity of available records constrained the interquartile analysis which was augmented by a qualitative assessment based on expert judgment. For Member States with fewer than two records (ES and SI), it was not possible to analyse the outliers, requiring the SCO to be extrapolated through statistical sources (as outlined in Step 5).

Table 26 – Date and outliers

MS	Relevant data on completed projects with no. of people covered by the system/service	Outliers
EL	20	6
ES	1	n/a
PL	60	27
SI	1	n/a

Source: Consortium

Step 3 involved **calculating the SCO for the two Member States** (EL, PL) that provided the necessary data. We calculated the average ratio between the verified costs and additional population served. This calculation was based on the data cleared outliers.

Step 4 involved **adjusting the rates for inflation**. Since the rates were based on data from 2014-2020, the estimates from Step 3 needed to be updated to reflect 2023 prices. Proxy rates were indexed based on the average cumulative inflation of the Harmonised Indices of Consumer Prices spanning the years 2018 to 2022 (i.e., HICP in Industrial Goods and Services - Eurostat, PRC_HICP_AIND - Annual average rate of change).

Step 5 involved **extrapolating rates for the remaining 25 Member States.** The cost of interventions were determined through linear regression. where the average cost per inhabitant in each Member State is treated as a dependent variable and the standardised average of the following independent statistical indicators as an explanatory factor:

- Labour cost for LCI (compensation of employees plus taxes minus subsidies) in Industry construction and services (EU27_2020 = 100) (Eurostat, LC_LCI_LEV);

- Price level index for Machinery and Equipment (EU27_2020 = 1) (Eurostat, PRC_PPP_IND)

Rates

In the table below the calculated rates can be found. Historical (base) data were highlighted in grey.

Table 27 – SCOs rates sub-area 3.2 (Euros)

MS	Rates
BE	589
BG	329
CZ	398
DK	647
DE	553
EE	391
IE	540
EL	390
IE	540
FR	580
HR	360
IT	499

MS	Rates
CY	418
LV	366
LT	354
LU	646
HU	342
MT	414
NL	587
AT	558
PL	347
PT	420
RO	345
SI	443
SK	390
FI	555
SE	577

Source: Consortium

Summary table

Table 28 – Summary table sub-area 3.2

Definition of the SCO	This SCO would cover the cost related to developing new drinking water infrastructure per additional inhabitant served by the improved water supply
Eligible activities	Construction of water infrastructure Project management Preparatory work Overheads
Target group for the beneficiary	Public entities (local and regional authorities, national public bodies and institutions)
Indicator name	CO 18 Additional population served by improved water supply
Measurement unit for the indicator	Number of inhabitants served by the improved water supply
Base calculation formula	$SCO = \frac{C_{total}}{n.additional\ pop}$, where

	n.additional pop is the total number of additional inhabitants served by the improved water supply C_{total} is total costs the operation, in EUR
Eligible costs	All eligible costs of the operation
Arrangements for the audit trail	Certificates providing evidence that the new drinking water infrastructure is operational and serves a specific number of additional inhabitants.
Key risks/limitations and measures to prevent perverse incentives	*Risk/limitation:* Risk of favouring beneficiaries from densely populated areas	*Mitigation measure:* The selection procedure should safeguard the principles of territorial cohesion
Method for regular adjustment of the rates	**Adjusted SCO = SCO * (1 + (Inflation Rate / 100),** where the Inflation Rate is the Harmonised index of consumer prices (HICP): average of Industrial Goods and Services (Eurostat, PRC_HICP_AIND). Annual average rate of change.

Source: Consortium

2.3.3.   Sub-area 3.3: Installing green roofs

Definition of the SCO

The output-based SCO reflects the **average cost of one m2 of green roof installed.** This SCO is based on data provided by three Member States (FI, EL, SK) using the common ERDF/CF output indicator *Surface of the green roofs installed, in m2.* The SCO covers:

- Construction (including preparation plans, implementation, other than materials, and project management);

- Equipment/Material (including plants/seeds).

Assessment of data

Data was collected directly from managing authorities and intermediate bodies by using a standardised data collection form. Data from Member States relies on verified expenditure from ERDF/CF. From the data collection, the study team identified that few Member States have implemented operations linked to this area. The study team conducted an extensive follow-up data collection process with all five Member States to improve the quantitative and qualitative detail of the data. However even with the follow-ups, two Member States were either missing key data on outputs (Bulgaria) or the data was part of a wider 'umbrella' project without the possibility to dissaggregate information specifically for green roofs (Germany). As previously mentioned, data from the alternative sources could not be used for this analysis (see more details in Annex 3).

For the 24 Member States that did not provide relevant or sufficient data, unit cost were based on unique green roof models from Finland, Greece and Slovakia. The data could not be used to extrapolate the remaining values as it had significant discrepancies and was not compatible. Therefore, our study team provided detailed descriptions of each country and explained the reasons behind the cost differences (also considering the economic situation of the country). Please see the rationale in the table below.

Table 29 – Comparison of green roof models

	Finnish model	Greek model[11]	Slovakian model
Type of green roof	**Innovative green roof** (innovative and experimental elements) ● Roof structure included: a. Water proofing b. Root barrier c. Filtering layer d. Drainage layer e. Layer of quilt to absorb water (for plants to use in irrigation during dry seasons); ● **Biochar experiment** [12] ● **Nordic vegetation**: herbs, grasses, perennials[13]. Also, diverse use of plants, and retrospective monitoring of plant survival.	**Intensive** green roof ● Construction costs included: waterproofing and substrate protection system (tar paper), anti-root membrane, geotextile, filter sheet, drainage system (gravel), plant growth substrate (plant soil); ● Automatic irrigation system ● **Unlimited plants** (Perennials, Shrubs, Trees)[14] and design varieties; ● Overall depth of the intensive roof system – 224 mm (average	**Extensive** green roof ● Less sophisticated preparation and construction (e.g. no roof insulation); ● No irrigation system; ● Limited vegetation: moss, herbs, grasses.
Preparation of the roof	No	**Costs for repairs** (e.g. arranging rainfall flow and restoring damage that affects its tightness)	No costs related to reconstruction or modernisation of the building or roof (including roof insulation) were eligible
Implementation	2015-2018	2020-2023	2020-2021

[11] Seven projects were implemented in Greece. According to the national authority, all the projects are compatible so the study team used their average costs. Projects included construction of plant substrate with drainage system, plants and watering system. The differences were a) requirements for reconstruction - roof maintenance where the construction will take place and b) selection of plants. At least one of these factors (in addition to the irrigation system or innovative elements) significantly increased the project costs.

[12] Biochar is the solid, carbon-rich material obtained by pyrolysis using different biomasses. https://www.intechopen.com/chapters/65070

[13] Plants used in Finnish project: Alchemilla alipina, Antennaria dioica, Aquilegia, Argentina anserina, Campanula rotundifolia, Dianthus x courtoisii, Festuca ovina, Fragaria vesca, Leucanthemum vulgarem, Rhodiola rosea, Saxifraga hostii, Saxifraga panniculata, Thymus serpyllum, Thymus serpyllum var. Ericoides, Viscaria alpina, Viscaria vulgaris

[14] Plants used in Greek projects:

Lavandula dentate, Thymus capitatus, Rosmarinus officinalis 'Prostatus', Origanum vulgare, Chamomilla recutica, Cichorium intybus L, Hypericum perforatum, Cazania splendens, Cistuscreticus, Aptenia cordifolia, Mesembryanthemun nodiflorum, Delosperma cooperi, Dichondra repens, Dichondra argentea, Dichondra micrantha.

Acanthus mollis, Artemisia 'Silver power', Lavandula spp, Origanum majorana, Origanum vulgare, Pittosporum tobira Nanum, Rosmarinus officinalis prostratus, Sedum acre, Sempervirum 'Royal Ruby', Thymus repens, Thymus vulgaris aureus, Verbena X hybrida.

Artemisia silver power, Lavandula stoechas, Salvia officinalis, Sedum acre, Thymus praecox, Verbena Tapien Violet.

Lavandula dentate, Thymus capitatus, Rosmarinus officinalis 'Prostatus', Origanum vulgare, Chamomilla recutica, Cichorium intybus L, Hypericum perforatum, Cazania splendens, Cistuscreticus, Aptenia cordifolia, Mesembryanthemun nodiflorum, Delosperma cooperi, Dichondra repens, Dichondra argentea, Dichondra micrantha.

Sedum album, Sedum floriferum, Sedum rupestre, Sedum spurium, Sedum telephium, Crassula radicans.

Festuca sp., Artemisia schmidtiana 'nana', Lavandula ang. 'Hidcote', Origanum dictamnus, Rosmarinus off. Prostratus Santolina chamaecyparissus, Stachys byzantina, Ajuga reptans, Ceratostigma plumbaginoides, Erica sp., Sedum sp. Cotoneaster dammeri, Hypericum calycinum.

	Finnish model	Greek model[11]	Slovakian model
EUROS / m2 15	224,41	199,1	64,50

Unit cost rates for the installation of green roofs varied among the three Member States due to the following reasons:

- Type of the green roof and its complexity. Installations of intensive green roofs in Greece and innovative green roof in Finland were more expensive than installation of extensive green roof in Slovakia. Appliance of automatic irrigation system (used usually for the intensive or semi-intensive type) has also impacted the costs in Greece and Finland.

- Necessity (or opportunity) to fully prepare the roof – constructional changes significantly increased the costs in Greece compared to two other countries where no specific preparation of the roof was done;

- Variety and types of plants used. Usage of the unlimited plants increased the costs in Greece compared to Slovakia where only simple plants were used;

- Innovative, smart aspects – biochar experiment and diverse use of nordic plants enabled the total costs to be higher in Finland relative other Member States.

Calculation method

Calculation process was facilitated at the level of cost item (construction costs and equipment/material costs) for the three green roof models. The process consisted of the following key steps:

Step 1 – cleaning of available historical data provided by five Member States (BG, DE, FI, EL, SK). Data for the following projects was not included in further analysis based on the following qualitative criteria:

- Projects that did not include sufficiently accurate data (costs and/or outputs) for the installation of green roofs in particular;

- Projects that reflected amounts of grants that did not cover all the relevant costs for the installation of green roofs.

Three Member States (FI, EL, SK) have given the study team sufficient quality data to move towards the next steps.

Step 2 – calculation of rates per one square meter (m2) at the cost item level for the three Member States that provided relevant historical data (FI, EL, SK). Here, we used verified costs of project(s) per two cost items (construction and equipment/material) and the number of square meters of green roof surface installed. The rates at cost item level are then summed together. The results of this step are unit cost rates for the installation of green roof(s) in each of three Member States in the historical sample (FI, EL, SK).

Rosmarinus officinalis 'Prostatus, Lavandula officinalis, Corydothymus capitatus, Menta piperita, Menta viridis,Origanum majiorana, Origanum vulgare, Salvia officinalis.

[15] These are total costs (including construction and equipment/material) based on historical data and adjusted for inflation.

Step 3 – adjustment of rates to account for inflation at cost item level (construction costs, equipment/materials). Since rates were drawn from historical data on interventions implemented in the period 2014-2023, estimates obtained in Step 2 had to be updated to align them with current (2023) prices. To this end, rates at cost item level were indexed according to average cumulative inflation of construction and tools/equipment for house and garden in different periods of 2014-2023:

- Finland (projects implemented in 2015-2018) – calculated average cumulative inflation index for 2019-2023.

- Greece (projects implemented in 2014-2023) – calculated average cumulative inflation index for 2020-2023.

- Slovakia (projects implemented in 2020-2021) – calculated average cumulative inflation index for 2022-2023.

Please note that for this step of the calculation process, we have used 'Construction producer prices or costs (STS_COPI_A)' and 'HICP - annual data (average index and rate of change) for tools and equipment for house and garden (PRC_HICP_AIND)'. The usage of the two indicators is done purposefully to be applied to the two cost categories calculated under this SCO. The used indices are tailored to be as applicable to niche operation type as possible. For the indices on construction producer prices (STS_COPI_A), the metadata indicates that the index already incorporates labour input indicators, such as number of employees and self-employed persons, hours worked by employees and ross wages and salaries Therefore, the usage of Labour Cost Index would be redundant and might distort the index by overweighting the share of labour costs for such projects and not accurately predicting the costs for equipment and material needed for installation of green roofs (which constitute a significant part of the total SCO amount).

Step 4 – statistical inference of missing rates for the remaining 24 Member States. Rates for these Member States were calculated based on indexation. The indexation draws on the following:

- independent (predictor) variable – the MS (Member State) index combining PLI index on construction and on machinery and equipment (specifically, Price level indices (EU27=100) for construction, and machinery/equipment (PRC_PPP_IND), and

- dependent (response) variables – a) the Finnish rate at cost item level (i.e., rates calculated in Step 2 and adjusted in Step 3); b) the Greek rate at cost item level; c) the Slovakian rate at cost item level.

It is important to highlight that the method adopted for this sub-area differs from all the other sub-areas in this study and is based on indexation. Due to the incompatible data among the three Member States (FI, EL, SK), it was not possible to use extrapolation based on a linear regression model for sub-area 3.3. Instead our study team proposed different calculation method for the remaining 24 Member States. Unit cost rates were indexed according to each green roof model – Finnish, Greek and Slovakian. See the proposed formulas for each model below.

1. MS index$_{(FI=100)}$ * FI cost rate / 100 = SCO$_{MS}$

2. MS index$_{(EL=100)}$ * EL cost rate / 100 = SCO$_{MS}$

3. MS index$_{(SK=100)}$ * SK cost rate / 100 = SCO$_{MS}$,

where *MS index$_{(FI=100)}$* represents independent variable – index combining PLI index on construction and on machinery and equipment in a certain Member State;

FI/EL/SK cost rates are dependent variables calculated in Step 2 and adjusted in Step 3.

Please note that for this step of the calculation process, we have used 'Price level indices (EU27=100) for construction, machinery/equipment (PRC_PPP_IND)', since the SCO includes construction costs (including preparation plans, implementation, other than materials, project management). Within this index, prices for construction are collected using a set of standard construction projects covering different types of buildings and civil engineering works. Prices for the projects are to be at the level of prevailing tender prices - that is, the prices of tenders that have been accepted by purchasers. Crucially, construction costs related to project management must be already included for the overall price of the tender - therefore, the index is able to reflect labour cost fluctuations. Similarly to the previous step, the usage of Labour Cost Index would not be relevant and might distort the index by overweighting the share of labour costs for such projects and not accurately predicting the costs for equipment and material needed for installation of green roofs (which constitute a significant part of the total SCO amount).

Rates

In the table below are reported the rates calculated by the study team based on the historical data from Finland, Greece, and Slovakia (adjusted to current price levels) and PLI for construction, and machinery/equipment.

Table 30 – SCOs rates for sub-area 3.3 (Euros)

MS	Finnish Model	Greek Model	Slovakian Model
AT	189,51	267,64	85,20
BE	170,61	240,95	76,71
BG	129,29	182,59	58,13
CY	151,11	213,41	67,94
CZ	146,81	207,34	66,01
DE	205,75	290,57	92,50
DK	207,03	292,39	93,08
EE	144,75	204,43	65,08
ES	151,97	214,62	68,33
FI	201,88	285,11	90,77
FR	182,64	257,93	82,11
EL	139,51	197,03	62,73
HR	122,16	172,52	54,92
HU	130,41	184,17	58,63

MS	Finnish Model	Greek Model	Slovakian Model
IE	177,48	250,66	79,80
IT	149,91	211,71	67,40
LT	133,58	188,66	60,06
LU	186,85	263,88	84,01
LV	147,59	208,43	66,36
MT	159,18	224,81	71,57
NL	189,85	268,13	85,36
PL	127,83	180,53	57,47
PT	149,22	210,74	67,09
RO	127,31	179,80	57,24
SE	218,20	308,16	98,11
SI	142,26	200,91	63,96
SK	146,73	207,22	65,97

Source: Consortium

It is worth noting that the Greek model has the highest costs at the EU level. This is due to the type of green roof (intensive), installation of automatic irrigation system and unlimited number and types of plants used. Additionally, significant changes in the construction of green roofs were made in certain Greek projects. The costs of Finnish model remain relatively high due to the innovative model used as well as the irrigation system applied. The lowest costs were recorded for Slovakian model where extensive green roof with the limited usage of plants and no irrigation system was installed.

Summary table

Table 31 – Summary for sub-area 3.3

Definition of the SCO	The output-based SCO reflects the average cost of green roof installed per m2. This SCO covers the cost of green roof construction and equipment/material when installing each of three types of green roofs: innovative Finnish model, intensive Greek model and extensive Slovakian model.
Eligible activities	Construction (including preparation plans, implementation other than material and project implementation); Equipment/Material (including plants/seeds and freight of materials).
Target group for the beneficiary	Public entities (local and regional authorities, national public bodies and institutions).

Indicator name	Surface of the green roof installed in m2.
Measurement unit for the indicator	M^2 of installed green roof. The definitions of types of green roofs should be strictly followed when measuring the results.
Base calculation formula	**MS index(FI=100) * FI cost rate / 100 =SCOMS** **MS index(EL=100) * EL cost rate / 100 =SCOMS** **MS index(SK=100) * SK cost rate / 100 =SCOMS ;** where Member State index (FI=100) is the independent variable - index combining PLI index on construction and on machinery and equipment in a Member State; FI/EL/SK cost rates are dependent variables calculated in Step 2 and adjusted in Step 3.
Eligible costs	All eligible costs of the operation.
Arrangements for the audit trail	<u>Proof of activities and project results are verifiable and real:</u> Certificate of service completion, with activities completed and the type of green roof that installed with signatures of beneficiary and service provider

	Risk/limitation 1: Installed green roof is of insufficient quality.	*Mitigation measure:* Details on the quality standards should be set in the call for proposal or grant agreement as conditions to be met (based on the details provided in Table 29).
Method for regular adjustment of the rates	*Adjusted SCO = SCO * (1 + (Inflation Rate / 100)), where the Inflation Rate is the average of the following indicators:* *- For cost item of construction, Annual inflation rates: Construction producer prices and costs (STS_COPI_A);* *- For cost item of equipment/materials, HICP (annual average rate of change) – tools and equipment for house and garden (PRC_HICP_AIND)*	

3. Conclusions

In conclusion, it is essential to highlight that the methodology was progressively adapted to meet the necessities that arose throughout the execution of the contract. Individual steps within the methodology were closely linked and were instrumental in enhancing the results at every stage of the process. From the outset, the study team understood that shaping EU-level SCOs was predominantly influenced by available data. Consequently, the methodological framework needed to offer sufficient flexibility to garner top-quality data from a broad spectrum of Member States. At certain intervals, the methodology's execution had to pause to refine and amend the strategy. This process sometimes merged distinct areas of the study to gather more comprehensive data for SCO calculations, ensuring areas with similar and comparative projects remained intact. As data analysis progressed, challenges related to consistency, comparability, and integrity became apparent. This highlighted the need to adjust specific design aspects of the EU-level SCOs, drawing continuous input from DG REGIO, the Transnational Network of ERDF/CF SCO experts, management entities, and intermediate organisations. These interactions were essential to adapting the methodology, considering obstacles encountered during data collection and the suggested SCO configurations.

To develop EU-level SCOs, the study team prioritised SCOs which reimburse Member States based on outputs and direct results. These include the number of people covered by improved e-governance, as opposed to input-based SCOs (i.e, hourly costs of technical staff). The study team pursued this approach because it was deemed to be more effective for the simplification purposes.

In sub-areas 1.1/1.2, the study proposes an EU-level SCO based on a unit cost per person covered by improved health services. After a thorough assessment of various options, this was found to be the most suitable due to its usability and simplification. Analysis of the data highlighted a significant diversity of indicators used to monitor this type of operation, which consequently influenced the option selection. The indicator aligns with CO36, facilitating consistent use across Member States and program authorities. This alignment should facilitate monitoring, enhancing the assessment of outcomes and thereby promoting wider adoption of the SCO. An additional advantage of this indicator is its attractiveness to beneficiaries since it decouples payment from final use, mitigating risks inherent in user-based payment models.

For sub-area 1.3, the EU-level SCO was built on the number of Days of Hospitalisation per patient. This SCO addresses the provision of PPE to manage emergency situations. Given its emergency focus, swift and efficient reimbursement is crucial. This SCO covers lower-priced items procured in substantial quantities, significantly simplifying the audit trail, enhancing accountability and transparency.

In sub-area 2.1/2.2, the study team proposed a lump sum for SMEs completing digital transformation activities. The term 'digital transformation' includes promoting e-services for SMEs (sub-area 2.1) and raising SME digital security profiles (sub-area 2.2). The SCO for the combined sub-areas would cover, as a minimum, the following activities: set up and maintenance of applications; hardware and software; staff and external consulting. The chosen metric aligns with the common ERDF/CF indicator 'number of firms receiving grants' which should allow the established monitoring practices of this indicator to continue. This alignment ensures more efficient monitoring of outputs, potentially increasing SCO uptake. The primary advantage of the approach lies in its flexibility. A lump sum would provide flexibility for activities that could be reimbursed and would not be too prescriptive, increasing its attractiveness and potentially enabling a higher uptake by MS. In addition, having a minimum list of mandatory activities would reduce the risk of SMEs breaking down the lump sum into smaller and less effective initiatives rather than focusing on more comprehensive (and potentially more impactful) activities.

For sub-areas 2.3/2.4/2.5 the study team proposed a unit cost per person covered by an improved e-governance system/service.The data from Member States related to highly customised projects, with diverse cost structures and outputs. Comparable data was a challenge across Member States and, in some instances, even within a single country. Following a comprehensive evaluation of alternatives, the most appropriate approach involved an indicator monitoring the population expected to benefit from the e-governance service. This indicator has the advantage of making the operation appeal to beneficiaries due to its detachment from final use, which might be perceived as overly risky. This approach also avoids the need to delve into intricate technical prerequisites that would be obligatory for each new service/system. The requirement for proving the quality and system/ service characteristics to trigger reimbursement could be an impediment.

In sub-area 3.2 the EU-Level SCO consists of a unit cost per additional person served by improved water supply. The chosen indicator is the common ERDF/CF indicator 'CO18 - Additional population served by improved water supply' This should enable easier monitoring of outcomes and thus allow for the SCO to be more widely used. For reimbursement it will be sufficient to provide evidence that the new drinking water infrastructure is operational and serves a specific number of additional inhabitants. This streamlined approach significantly lightens the reimbursement process, fostering investments in water supply and subsequently mitigating the risk of resource wastage and a decline in water quality.

In sub-area 3.3, the study team proposed the output-based SCO reflecting the average cost of a green roof installed per m2. Due to the historical data shortage (lack of data from 24 Member States) and incompatible cost values from the remaining EU members – Finland, Greece and Slovakia – it was not possible to make estimates for all Member States based on the historical sample. Therefore, the unit cost rates for a distinct green roof model were calculated so Member States could freely select the model they intend to implement - the innovative Finnish, intensive Greek or extensive Slovakian models. In-depth analysis on the contextual factors of each green roof type demonstrated their uniqueness and reasoning behind the cost differences. It also provided detailed information on technical specificities of the intervention which should be strictly followed when using the proposed SCO and measuring the results.

Annex 1 - Programmes involved in the data collection

The table below lists the programmes involved in the data collection. During inception phase of the study four Member States (Austria, Denmark, Luxembourg and Sweden) declared that interventions addressed by the study were not funded by any of their OPs.

Table 32 – Programmes covered involved in the data collection activity

The table below displays the programmes contacted, whether they provided data and if they were involved in the follow-up activity

MS	OP	Status	1st follow-up	2nd follow-up
BE	OP Flanders	Data received	✓	✓
BE	OP Wallonia	No relevant operations funded		
BE	OP Brussels	No relevant operations completed		
BG	OP Innovation and Competitiveness	Data received		
BG	OP Environment	Data received	✓	
BG	OP Regions in Growth	Data received	✓	
CY	Competitiveness and sustainable development	Data received	✓	✓
CZ	Enterprise and Innovation for Competitiveness OP (EIC)	Data received	✓	✓
CZ	Integrated Regional OP 2014-2020 (IROP)	Data received	✓	✓
CZ	OP Prague Growth Pole ERDF	Data received	✓	✓
CZ	Environment OP	Difficulties in extracting data from the monitoring system		
DE	Sachsen	Data received	✓	✓
DE	Schleswig-Holstein	Data received		✓
DE	Brandenburg	Data received	✓	✓
DE	Sachsen-Anhalt	Data received	✓	✓
DE	Niedersachsen	Data received		✓
DE	Nordrhein-Westfalen	No relevant operations funded		

MS	OP	Status	1st follow-up	2nd follow-up
DE	Mecklenburg-Vorpommern	No relevant operations funded		
EE	Cohesion Policy Funding OP – ERDF/CF/ESF	Data received	✓	✓
EL	Central Macedonia OP	Data received	✓	✓
EL	Eastern Macedonia-Thrace OP	No data provided		
EL	Crete OP	Data received	✓	✓
EL	Thessaly OP	Data received	✓	✓
EL	Transport Infrastructure	Data received	✓	
EL	Reform of the Public Sector OP	Data received	✓	✓
EL	Environment and Sustainable Development OP	Data received		✓
ES	Andalucía ERDF 2014-20 OP	Data received		✓
ES	Aragón ERDF 2014-20 OP	No data provided		
ES	Asturias ERDF 2014-20 OP	Difficulties in extracting data from the monitoring system		
ES	Baleares ERDF 2014-20 OP	No data provided		
ES	Canary Islands ERDF 2014-20 OP	Data received		✓
ES	Cantabria ERDF 2014-20 OP	No data provided		
ES	Castilla y León ERDF 2014-20 OP	No relevant operations funded		
ES	Castilla-La Mancha ERDF 2014-20 OP	Data received		✓
ES	Cataluña ERDF 2014-20 OP	Data received	✓	✓
ES	Ceuta ERDF 2014-20 OP	No data provided		
ES	Comunidad Valenciana ERDF 2014-20 OP	No data provided		
ES	Extremadura ERDF 2014-20 OP	Data received		✓
ES	Galicia ERDF 2014-20 OP	Data received	✓	✓
ES	La Rioja ERDF 2014-20 OP	No data provided		

MS	OP	Status	1st follow-up	2nd follow-up
ES	Madrid ERDF 2014-20 OP	Data received	✓	✓
ES	Melilla ERDF 2014-20 OP	No relevant operations funded		
ES	Murcia ERDF 2014-20 OP	Data received		
ES	Navarra ERDF 2014-20 OP	No data provided		
ES	País Vasco ERDF 2014-20 OP	No relevant operations funded		
ES	SME Initiative ERDF 2014-20 OP	Data received		✓
FI	Sustainable Growth and Jobs	Data received	✓	✓
FR	ROP Centre 2014-2020 ERDF/ESF	Data received		✓
FR	ROP Aquitaine 2014-2020 (Nouvelle Aquitaine)	Data received	✓	✓
FR	ROP Poitou-Charentes (Nouvelle Aquitaine)	Data received	✓	✓
FR	ROP Limousin (Nouvelle Aquitaine)	Data received	✓	✓
FR	ROP Nord-Pas de Calais 2014-2020 (Hauts de France)	No data provided		
FR	ROP Picardie 2014-2020 (Hauts de France)	No data provided		
FR	OP Réunion	Difficulties in extracting data from the monitoring system		
FR	Auvergne OP – ERDF/ESF (Auvergne Rhône Alpes)	Data received		✓
FR	Rhône Alpes OP – ERDF/ESF (Auvergne Rhône Alpes)	Data received		✓
FR	Guadeloupe	Data received	✓	
FR	Guyane	No data provided		
FR	Languedoc-Roussillon OP – ERDF/ESF (Occitanie)	Data received	✓	✓
FR	Midi-Pyrénées et Garonne OP – ERDF/ESF (Occitanie)	Data received	✓	✓
FR	Bourgogne OP – ERDF/ESF (Bourgogne Franche Comté)	Data received	✓	✓

MS	OP	Status	1st follow-up	2nd follow-up
FR	Franche Comte et Jura OP ERDF/ES (Bourgogne Franche Comté)	Data received	✓	✓
HR	Competitiveness and Cohesion OP	Data received	✓	
HU	Competitiveness and Cohesion OP – ERDF/ESF	Data received	✓	
IE	Border, Midland and Western Regional Operational Programme 2014-2020	No data provided		
IE	Southern & Eastern Regional Operational Programme	Data received		
IT	Campania	It was not possible to provide data in time		
IT	Education - IT – ESF/ERDF	No relevant operations funded		
IT	Emilia-Romagna - ERDF	Data received	✓	✓
IT	Enterprises and Competitiveness - IT – ERDF	Data received	✓	✓
IT	Friuli-Venezia Giulia - ERDF	No data provided		
IT	Lazio - ERDF	Data received	✓	
IT	Liguria - ERDF	Data received		✓
IT	Metropolitan Cities - IT – ERDF/ESF	No data provided		
IT	Molise – ERDF/ESF	Difficulties in extracting data from the monitoring system		
IT	Piemonte – ERDF	No data provided		
IT	Puglia – ERDF/ESF	Data received		✓
IT	Sicilia – ERDF	No data provided		
IT	Social Inclusion - IT – ESF	No relevant operations funded		
IT	Toscana – ERDF	No data provided		
IT	Umbria – ERDF	Data received		✓
IT	Valle d'Aosta – ERDF	No data provided		
IT	Veneto – ERDF	No data provided		

MS	OP	Status	1st follow-up	2nd follow-up
IT	Sardegna	Data received		
LT	EU Structural Funds Investments OP – ERDF/ESF/CF	Data received	✓	✓
LV	Growth and Employment OP	Difficulties in extracting data from the monitoring system		
MT	Fostering a competitive and sustainable economy to meet our challenges	Data received	✓	✓
NL	East Netherlands OP	Data received	✓	
NL	South Netherlands OP	Data received	✓	
NL	West Netherlands OP	Data received	✓	
NL	North OP	No relevant operations funded		
PL	ROP Kujawsko-Pomorskie	Data received	✓	✓
PL	ROP Lubelskie	Data received	✓	✓
PL	ROP Lubuskie	Data received	✓	✓
PL	ROP Dolnośląskie	Data received	✓	✓
PL	ROP Wielkopolskie	Difficulties in extracting data from the monitoring system		
PL	ROP Pomorskie	Data received	✓	✓
PL	ROP Łódzkie	Data received	✓	✓
PL	ROP Małopolskie	Data received	✓	✓
PL	ROP Opolskie	Data received	✓	✓
PL	ROP Śląskie	Difficulties in extracting data from the monitoring system		
PL	ROP Podlaskie	Data received	✓	✓
PL	ROP Warmińsko-Mazurskie	Data received	✓	✓
PL	OP Infrastructure & Environment	Data received	✓	✓
PL	ROP Podkarpackie	Data received	✓	✓

MS	OP	Status	1st follow-up	2nd follow-up
PL	ROP Świetokrzyskie	Data received	✓	✓
PL	ROP Zachodniopomorskie	Data received	✓	✓
PL	OP Digital Poland	Data received	✓	✓
PT	AÇORES 2020	Data received	✓	✓
PT	COMPETE 2020 (FEDER)	Data received		✓
RO	OP Competitiveness	Data received	✓	✓
RO	OP Administrative Capacity (ESF)	No relevant operations funded		
RO	OP Large Infrastructure	Data received	✓	
SI	OP for the Implementation of the EU Cohesion Policy – ERDF/ESF/CF	Data received	✓	✓
SK	Quality of Environment OP	Data received		✓
SK	Integrated Infrastructure OP	No data provided		
SK	Integrated Regional OP	Data received	✓	

Source: Consortium

Annex 2 – EU Level SCOs calculations

This annex contains the clean data collected from Member States which were the basis for calculations, statistical inferences and extrapolations. It is submitted alongside the Final Study Report as separate MS Excel files for Areas 1-3:

- Dataset and calculations for Area 1.1_1.2

- Dataset and calculations for Area 1.3

- Dataset and calculations for Area 2.1_2.2

- Dataset and calculations for Area 2.3_1.4_2.5

- Dataset and calculations for Area 3.2

- Dataset and calculations for Area 3.3

Annex 3 - Data quality for Areas 1, 2 and 3

Area 1: Health

Sub-areas 1.1 and 1.2

Overivew of the data

For sub-areas 1.1 and 1.2, we received data from 17 Member States.

As illustrated in the table below, despite similar numbers of OPs the number of projects varies by Member State.

Table 33 – 1.1/1.2: overview

Member State	No. of OPs	No. of records			
		Total	Relevant and completed	AND with data on total costs	AND with indicator' values
BE	1	4	2	2	2
CZ	1	2	2	2	2
DE	2	10	10	10	10
EE	1	1	-	-	-
EL	2	2	2	2	2
ES	4	10	8	8	8
FI	1	35	34	34	7
FR	3	13	13	13	12
HU	1	1	-	-	-
IT	2	16	3	3	3
LT	1	3	2	2	2
MT	1	4	3	3	3
NL	3	3	3	3	3
PL	9	152	147	147	146
PT	2	18	13	13	13
RO	1	2	-	-	-

Member State	No. of OPs	No. of records			
		Total	Relevant and completed	AND with data on total costs	AND with indicator' values
SI	1	2	1	1	1
TOT	36	278	243	243	214

Source: Consortium

Some records were removed since they refer to ongoing projects or operations not relevant to the sub-areas. For instance, some records from Açores (PT) were excluded since they refer to projects focused on the purchase of sanitary equipment and are unrelated to the development and use of a uniform electronic registries or the development of e-health services. 214 records from 14 Member States refer to completed and relevant projects and include data on total costs and indicators.

Costs

Collection forms also covered eligible costs under operations supporting the development and use of a uniform electronic health care information system.

The data collection revealed that most costs related to activities unique to countries. This indicates significant differences in eligible costs for most Member States which provided data.

The eligible costs differ significantly by Member State, with more than 40 unique activities listed by the OPs. To address this variety, the study combined similar categories by aggregating the following:

Construction works:

- Construction and assembly works

- Preparatory works

- Construction works, installation and adaptation works

- Execution of construction works server room

- Construction contracts.

Digital provider costs:

- IT services

- As Feasibility study/ Technical concept

- Diagnostics.

Fee for consultation:

Acquisition of services to third parties - Technical Assistance and Consultancy

- External services

- Contract Engigneer

- Purchase of intangible assets

- Other services

- Recurrent services.

Management costs:

- Project supervision

- As Purchase, installation, and maintenance of IT equipment

- Network equipment for broadband internet

- Maintenance costs

- Equipment

- Others: tablets, bar code scanners, printers, and other hardware for some of hospitals/hospital departments

- Miscellaneous material to equip the buildings, services to adapt he Prescription Systems to issuing dematerialised prescriptions, Creation and implementation of an application which allows mobile access to the SRS

- Equipment - Renovation of diagnostic stations

- Equipment - Microphones Recognition.

Purchase, and maintenance of non-IT equipment:

- Purchase of fixed assets

- Purchase of fixed assets (medical equipment)

- Transport monitors/defibrillators, with in-built data transmission and associated software

- Equipment - Renovation of clinical stations.

Others:

- Expenses in kind

- VAT.

Activities funded by most of the Member States were:

Table 34 – Sub-areas 1.1 and 1.2: cost categories

Member State	Consultation	Promotion	Purchase, installation, and maintenance of IT equipment	Purchase, installation, update and upsize of software	Staff	Technical development of smart applications	Training
BE		✓	✓		✓	✓	✓
DE					✓		
EL			✓	✓			✓
ES			✓	✓		✓	
FI	✓				✓		
FR		✓	✓	✓			✓
LT	✓	✓	✓	✓	✓	✓	✓
MT	✓			✓			✓
PL	✓	✓	✓	✓	✓	✓	✓
PT	✓		✓	✓	✓		
SI	✓	✓	✓		✓		

Source: Consortium

The most frequent costs are:

- Purchase, installation and maintenance of IT equipment;

- Purchase, installation, update and upsize of software;

- Training;

- Staff;

- Promotion.

- Consultations

Output and results

The approach to monitoring outputs and results differs by Member State. There are over 30 indicators for monitoring operations on the development and use of a uniform electronic health care information system or the development of digital primary care services.

The box below lists the indicators used by Member States that provided information on completed projects.

Indicators for sub-areas 1.1 and 1.2

- Direct employment increase in supported enterprises (CO08)

- No. of blood donation services

- No. of cases settled using e-services

- No. of consumers registered for the new service

- No. of downloads/launches of applications based on re-use of public sector information and public e-services

- No. of electronic health transactions between health-care providers and patients

- No. of enterprises cooperating with research institutions products (CO26)

- No. of enterprises supported to introduce new to the firm products (CO29)

- No. of enterprises supported to introduce new to the market products (CO28)

- No. of entities providing intra-administrative services

- No. of entities making public sector information available online

- No. of e-services created

- No. of firms receiving grants (CO02)

- No. of ICT systems set up in entities performing public tasks

- No. of intra-administrative services made available

- No. of new digital services

- No. of new functionalities on information systems

- No. of patient records in the system

- No. of people benefitting from the new information system

- No. of projects supported to increase digital usage

- No. of online public services with a maturity level of at least three years

- No. of users with access to or covered by eGovernment applications/services

- Population benefitting from digital services

- Population covered by basic digital health services

- Population covered by improved health services (CO36)

- Population served by the entity(ies)

- Population served by the operation

- Projects supported to create new online public services

- Private investment matching public support in innovation or R&D projects (CO27)

- Public administration services provided

- Total information systems created

Some of these indicators are used by more than one Member State that provided completed data on relevant projects, in particular:

- 'Total number of information system/e-services created' adopted by BE, CZ, EL, LT, MT, PL, and PT

- 'n. of people benefitting from the new information system' EL and PL

- 'CO36_Total population covered by improved health services' by EL and MT

Sub-areas 1.3

Overview of the data

For sub-area 1.3, we received data from 14 Member States (DE, EE, ES, FR, HR, IE, IT, LT, MT, PL, PT, SK, RO, SI).

As illustrated in the table below, the number of projects varies by Member State.

Table 35 – Sub-area 1.3: overview

Member State	No. of OPs	No. of records received			
		Total	Relevant and completed	AND with data on total costs	AND with indicators' values
DE	1	1	1	1	1
EE	1	1	1	1	1
ES	5	25	22	22	22
FR	1	3	3	3	3
HR	1	1	1	1	1
IE	1	1	1	1	1
IT	4	9	9	9	8
LT	1	8	8	8	8
MT	1	1	1	1	1

Member State	No. of OPs	No. of records received			
		Total	Relevant and completed	AND with data on total costs	AND with indicators' values
PL	9	95	94	93	90
PT	1	1	1	1	1
RO	1	311	311	303	303
SI	1	1	1	1	1
SK	1	3	3	3	3
TOT	29	461	457	448	432

Source: Consortium

Only four records (one for PL and three for ES) refer to ongoing projects.

All data provided by these Member States refer to projects supporting the purchase of PPE.

A further level of filtering was carried out on the basis of the desk research only projects providing data on CV06 divided per items were taken into consideration.

Costs

For completed and relevant projects, thirteen Member States provided qualitative information on eligible costs.

The costs differ significantly by Member State, with more than 65 unique activities. Those funded by more than three Member States were:

Table 36 – Sub-area 1.3: cost categories

Member State	Gloves	Goggles/ Protective glasses	Gowns	Particulate respirators protective clothing/scrubs	Shoe protective covers/ overboots/ overshoes	Disposable headwear (caps, hoods, head covers hairnets)	Disinfection liquid
EE	✓	✓	✓	✓	✓	✓	
ES	✓	✓	✓	✓	✓	✓	
FR	✓	✓	✓				✓
HR	✓	✓			✓		✓
IE	✓	✓	✓		✓	✓	
IT	✓	✓	✓	✓	✓	✓	
LT	✓	✓	✓	✓	✓	✓	

Member State	Gloves	Goggles/ Protective glasses	Gowns	Particulate respirators protective clothing/scrubs	Shoe protective covers/ overboots/ overshoes	Disposable headwear (caps, hoods, head covers hairnets)	Disinfection liquid
MT		✓	✓				✓
PL	✓	✓	✓	✓	✓	✓	✓
PT	✓	✓			✓		
RO	✓	✓	✓	✓	✓	✓	✓
SK	✓		✓	✓	✓		✓

Source: Consortium

The most frequent costs are for:

- Gloves;

- Goggles/ Protective glasses;

- Gowns;

- Shoe protective covers/ overboots/ overshoes.

Given the large number of different medical equipment categories covered by OPs, the study team opted to focus the SCOs on: Respiratory protection, Eye protection, Body protection, and Hand protection. This decision was substantiated by desk research.

Based on these four classes of PPE, the study aggregated the categories as follows:

Respiratory protection includes:

- FFP2 mask

- Ff3 mask

Eye protection includes:

- Goggles

- Face shield

- Protective glasses

- Medial protective visors

- Medical disposable face shield

Body protection includes:

- Coverall

- Aprons

- Gowns

Hand protection includes:

- Gloves

Output and results

The approach to monitoring outputs and results differs by Member State. The box below lists indicators used by Member States that provided information on completed projects.

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Indicators sub-areas 1.1 and 1.2

- CO36_Population covered by improved health services
- CV1_Value of personal protective equipment purchased (total public cost)
- CV11_Ambulances and vehicles purchased for emergency response
- CV4_Value of IT equipment and software/licences in COVID 19 response
- CV4a_Value of SME IT equipment and software/licences in COVID 19 response
- CV6_No. of PPE purchased
- CV7_No.of ventilators to support treatment of COVID 19
- Increased inpatient capacity for patients with Covid-19
- No. of accessories for suction cups purchased
- No. of bags for waste purchased
- No. of coveralls purchased
- No. of COVID 19 tests purchased
- No. of disinfectants purchased
- No. of equipped laboratories
- No. of facilities for hazardous waste purchased
- No. of germicidal radiators purchased
- No. of gloves purchased
- No. of gowns purchased
- No. of masks purchased
- No. of medical devices purchased
- No. of medical equipment purchased, other than coronavirus tests and respirators
- Quantity of mobile plasma disinfectant purchased
- No. of monitors purchased
- No. of other medical devices purchased
- No. of particulate respirators protective clothing/scrubs purchased
- No. of patients benefiting from the purchase of PPE
- No. of shoe protective covers/overboots/overshoes purchased
- No. of sterilisers purchased

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- No. of supported medical entities

- No. of supported medical entities in connection with the COVID-19 pandemic

- No. of thermocameras purchased

- No. of ventilators purchased

- Value of eligible expenses for activities related to COVID-19

- Value of medicines purchased to treat COVID 19

Some of these indicators are used by more than one Member State. In particular:

- CV6_No. of PPE purchased used by ES, FR, HR, IE, IT, MT, PL, and PT.

- No. of medical devices purchased used by IE, IT, LT, PL, PT, DE, RO, and EE.

These two indicators capture different types of medical devices. More than 65 types of medical device are covered making it hard to merge the types of device, even in terms of cost, under a single indicator.

Data from alternative sources

In 2020, the European Centre for Disease Prevention and Control (ECDC) drafted a technical report to 'support public health preparedness planning with regard to personal protective equipment (PPE) needs in healthcare settings where patients suspected or confirmed to have been infected with the novel coronavirus 2019- nCoV are being treated'. This report provides a definition of the minimal composition of PPE to be used in healthcare during the 2019- nCoV pandemic.

Table 37 – Minimal PPE to manage suspected or confirmed cases of 2019-nCoV

Protection	Suggested PPE
Respiratory protection	FFP2 or FFP3 respirator
Eye protection	Goggles or face shield
Body protection	Long-sleeved water-resistant gown

Source: ECDC technical report

The report also estimated the PPE needs, defining the amount of PPE to be used (i) per case of 2019- nCoV detected and (ii) per day and per patient, differentiating between mild and severe symptoms. These estimates are presented in the table below, where each unit refers to one set of PPE.

Table 38 Sub- Minimum sets for each case scenario

Healthcare staff	Suspected case	Mild symptoms	Severe symptoms
	Number of sets per case	Number of sets per day per patient	
Nursing	1-2	6	6-12
Medical	1	2-3	3-6
Cleaning	1	3	3
Assistant nursing and other services	0-2	3	3
Total	3-6	14-15	15-24

Source: ECDC technical report

Area 2: ICT

Sub-areas 2.1 and 2.2

Overview

As of July 2023, we had processed data on sub-areas 2.1 and 2.2 from 16 Member States (BE, BG, CY, CZ, DE, EL, ES, FI, FR, HR, IT, MT, PL, PT, RO, and SI). As illustrated in the table below, the records varied by Member State, with Spain and Germany having the most OPs, followed by Italy and Poland, together contributing most of the records. The majority of data (85%) referred to completed projects, including those to be completed in 2023. The remaining 15% related to ongoing projects or where the reference period was unspecified.

Table 39 – Sub-areas 2.1 and 2.2: overview

Member State	No. of OPs	No. of records			
		Total	Completed*	AND with data on total costs	AND with indicators' values
BE	1	1	1	1	1
BG	1	4	4	4	4
CY	1	1	1	1	1
CZ	2	13	13	13	13
DE	4	4431	4428	4428	4424
EL	2	2	2	2	2

Member State	No. of OPs	No. of records			
		Total	Completed*	AND with data on total costs	AND with indicators' values
ES	6	6456	4610	4610	3732
FI	1	57	57	57	31
FR	2	11	11	11	11
HR	1	376	376	376	376
IT	4	344	344	344	344
MT	1	65	65	65	65
PL	4	57	57	57	57
PT	1	65	65	65	65
RO	1	262	262	262	139
SI	1	2	2	2	1
TOT	33	12147	10298	10298	9266

Source: Consortium

Note: the list includes projects to be completed in 2023

Costs

The eligible costs differed significantly by Member State, with more than 100 activities listed. Activities funded by more than five Member States were:

- Consulting;

- Domain;

- Hardware/software purchase and licensing;

- Server and/or cloud services for the implementation of activities;

- Set up and maintenance of applications;

- Staff;

- Training.

Among the 16 Member States that provided information on sub-areas 2.1 and 2.2, 15 shared qualitative information on eligible costs and also specified (at least partially) the costs for each category for at least one completed project. The amounts varied by Member State, with the most relevant categories being hardware/software purchase and licensing

(with 12 Member States providing information on these), set up and maintenance of applications (9 Member States) and training (9 Member States).

Most costs related to activities unique to countries, with significant differences in eligible costs for most Member States. To address this, the study consolidated similar categories by grouping the following costs:

Set up and maintenance of application costs:

- Creating a new website/webshop

- Development, implementation and/or set up of applications

- E-commerce

- Online payment gateway

- Set up and maintenance of applications

- Specific webpage-based service development and implementation (services of a specialised firm)

- Webpage development and implementation (services of a specialised firm)

- Website design & development.

Domain, server, and cloud costs:

- Costs of domain

- Costs of domain, server and/or cloud services to implement activities

- Server and/or cloud services to implement activities

Hardware and software costs:

- Hardware purchase and licensing

- Hardware/software purchase and licensing

- Off-the-shelf software

- Purchase, installation and maintenance of IT equipment

- Purchase, installation, update and upsize of software

- Software purchase and licensing

- Subscription-based costs/licenses.

Staff and external consulting:

- Consultancy costs to prepare project documentation

- Consultancy services to elaborate documents necessary to submit the project

- Consulting

- Eligible expenditure for consultancy acquisitions

- Consultancy services

- Expert staff, security audit provided by external company

- External services and experts

- Fee for consultation

- Innovation consulting activities

- Internal staff costs

- Procurement of consultancy services to obtain grant funding

- Salaries and wages without statutory employer fees

- Staff

- Staff /consulting

- Wage & salary costs.

Training:

- Education

- Eligible expenditure for personnel to acquire skills to manage the innovation introduced by the project

- Training.

Table 40 lists the coverage of each cost category after combining similar costs.

Table 40 – Sub-areas 2.1 and 2.2: Cost categories

Member State	Set up and maintenance of application	Domain, server and cloud	Hardware and software	Staff and external consulting	Training
BE	✓	✓	✓	✓	✓
BG	✓	✓	✓	✓	
CY			✓		
CZ	✓		✓	✓	✓
DE	✓	✓	✓	✓	✓
EL	✓	✓	✓		

Member State	Set up and maintenance of application	Domain, server and cloud	Hardware and software	Staff and external consulting	Training
ES	✓	✓	✓	✓	✓
FI				✓	
FR	✓	✓	✓	✓	✓
HR	✓	✓			✓
IT	✓	✓	✓	✓	✓
MT	✓	✓	✓	✓	✓
PL	✓	✓	✓	✓	✓
PT	✓		✓	✓	✓
RO			✓	✓	✓
SI	✓		✓	✓	✓

Source: Consortium

Output and results

The approach to monitoring outputs and results differed greatly by Member State. More than 40 outputs were listed by the Ops (Box 1). Despite the differences, some indicators were used by more than one Member State. The most common were:

- Number of firms receiving grants, tracked by eleven Member States (BG, CY, CZ, DE, ES, FR, EL, HR, IT, MT, and PL);

- Number of e-services created, tracked by seven Member States (BE, CZ, ES, HR, MT PL, and PT).

Indicators used by Member States that provided information on completed projects.

Indicators sub-areas 2.1 and 2.2

- Companies impacted by awareness-raising, dynamisation, and consciousness actions

- Companies that develop a new or a significantly improved product on the market (new to the company)

- Companies that develop a new or a significantly improved product on the market (new to the market)

- Expected increase of turn-over (project level)

- Expected reduction of costs (project level)

- Increased employment in supported enterprises

- Innovative ICT products and services supported

- New households that have broadband access of at least 30 Mbps

- New jobs created in the enterprises due to aid/support

- NGA broadband coverage/availability (% households)

- Number of accelerated business processes

- Number of companies receiving non-financial support

- Number of companies supported for products new to the company

- Number of enterprises cooperating with research institutes

- Number of enterprises covered by support to introduce products new to the market

- Number of enterprises receiving financial support beyond grants

- Number of enterprises receiving grants

- Number of enterprises receiving support

- Number of enterprises supported during the project

- Number of enterprises supported to introduce products new to the company

- Number of firms receiving grants

- Number of firms receiving grants to introduce a product new for the firm

- Number of firms receiving grants to introduce new product for the market

- Number of firms using information and communication technology

- Number of introduced process innovations

- Number of introduced product innovations

- Number of new companies receiving support/benefiting from the aid

- Number of new information systems

- Number of newly supported e-services for SMEs

- Number of project completions through certification

- Number of researchers operating in improved research infrastructure

- Number of supported enterprises

- Number of users of the common business point

- Private investment combined with public support in R&D or innovation projects

- Private investments complementing public support for businesses (subsidies)

- Private investments corresponding to public support to companies (grants)

- Private investments supplementing public support for businesses (excluding subsidies)

- Project completion through certification

- Revenue from the sale of new or improved products/processes

- Number of e-services created

- Number of new digital security solutions adopted by the SMEs

- Number of SMEs which introduce new products to its organisation

- Value added of SMEs

Sub-areas 2.3, 2.4 and 2.5

Overview

For sub-areas 2.3, 2.4 and 2.5, we received data from 15 Member States.

As illustrated in the table below, despite similar numbers of operational programmes (OPs) the number of records (each covering one project) varies by Member State.

Table 41 – Sub-areas 2.3, 2.4 and 2.5: overview of the data

Member States	No. of OPs	No. of records received			
		Total	Relevant and completed	AND with data on total costs	AND with indicators' values
BE	1	14	14	14	14
CZ	1	5	5	5	5
DE	2	59	0	0	0
EE	1	5	5	5	4
EL	3	11	11	11	11
ES	4	35	35	35	29
FI	1	125	8	8	4
FR	6	72	48	48	45
IT	3	23	23	23	23
LT	1	24	24	24	24

Member States	No. of OPs	No. of records received			
		Total	Relevant and completed	AND with data on total costs	AND with indicators' values
MT	1	19	19	19	19
PL	8	237	230	230	226
PT	2	32	32	32	31
RO	1	486	117	117	117
SI	1	6	3	3	3
TOT	36	1153	574	574	555

Source: Consortium

Some records were removed as they refer to ongoing projects or operations not relevant to the sub-areas. For example, Competitiveness OP (RO) had a significant number of projects focused solely on purchasing ICT equipment for schools, without including any costs associated with service development. Similarly, in DE and FI, many projects referred to SMEs rather than public administration.

Costs

The eligible costs differ significantly by Member State, with more than 150 unique activities.

Most costs related to activities unique to countries. This indicates significant differences in eligible costs for most Member States which provided data. To address this, the study consolidated similar cost categories. Details of this aggregation are listed below:

Construction works:

- Construction and assembly works, implementation works

- Implementation works

- Construction, installation and adaptation works

- Execution of construction works – net.

Consultancy Services:

- External services

- Expenditure on consultancy and expertise, including project preparation

- Consultancy activity for the project

- Quality assurance services

- Tangible and intangible investment expenditure (definition of communication strategy)

- Tangible and intangible investment expenditure (business strategy)

- Expenditure on external services (methodological support for the project)

- Expenditure on external services (implementation of enhanced site connectivity)

- Acquisition of services to third parties - Technical Assistance and Consultancy.

Feasibility study:

- Feasibility study and technical concept of the project.

Indirect costs:

- Indirect expenditure in the form of simplified costs

- Overhead.

Network equipment for broadband internet:

- Development of Campus WI-FI infrastructure.

Others:

- Execution of ICT network

- Data bus implementation

- Audit National Interoperability Framework

- Project audit

- Development of safety documentation.

Project management:

- Technical consultancy related to project management

- Project supervision.

Project preparation:

- Preparatory work.

Project promotion:

- Publicity

- Communication costs of the operation (communication and promotion of the permanent digital tool)

- Communication expenses for the operation (fablab launch day)

- Expenditure on communication of the operation (publications and communications).

Purchase, installation and maintenance of IT equipment:

- IT services

- Installation and configuration - net

- Delivery of equipment - net

- System implementation and delivery of IT infrastructure – net.

Purchase, installation, update and upsize of software:

- Purchase of intangible assets II - net_amounts

- Tangible and intangible investment expenditure (software).

Staff costs:

- Internal salary

- Salary and expenses

- Staff costs

- Staff costs, studies, overhead-material costs.

Travel:

- Mission

- Travel

- Travel, catering and accommodation expenses.

The activities funded by most Member States which provided data on relevant complete projects were:

Table 42 – Sub-areas 2.3, 24 and 2.5: cost categories

Member State	Setting up and maintaining application	Purchase, installation, update and upsize of software	Purchase, installation and maintenance of IT equipment	Network equipment for broadband internet	Promotion	Subscription-based costs/licenses	Training	Staff	Consultancy Services	Quality control costs, publicity	Project management
BE	✓	✓			✓	✓	✓	✓		✓	✓
CZ		✓	✓		✓		✓				
EE	✓	✓								✓	✓
EL	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓

Member State	Setting up and maintaining application	Purchase, installation, update and upsize of software	Purchase, installation and maintenance of IT equipment	Network equipment for broadband internet	Promotion	Subscription-based costs/licenses	Training	Staff	Consultancy Services	Quality control costs, publicity	Project management
ES	✓	✓	✓			✓	✓	✓			✓
FI								✓	✓		
FR		✓		✓	✓		✓	✓	✓		
IT		✓	✓	✓	✓		✓				✓
LT	✓	✓	✓		✓	✓		✓			✓
MT	✓	✓	✓		✓			✓	✓		
PL	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
PT	✓	✓	✓	✓	✓	✓			✓	✓	
RO			✓	✓	✓		✓		✓	✓	✓
SI	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓

Source: Consortium

The most frequent costs are:

- Purchase, installation, update and upsize of software;

- Purchase, installation and maintenance of IT equipment;

- Promotion costs

- Setting up and maintaining application

- Training

- Project Management.

Output and results

The approach to monitoring outputs and results differs by Member State. The box below lists indicators used by Member States that provided information on completed projects**.**

Indicators sub-areas 2.3, 2.4 and 2.5

- No. of services created

- No. of registers created

- Total number of users (citizens using the service)

- Total population covered by the e-service

- No. of information systems acquired

- No. of public institutions that improved their functioning thanks to digital advancement

- No. of public services available online with a maturity level of at least three - two-way interaction

- No. of entities that made public sector information available on-line

- No. of IT Systems

- No. of cases settled with the use of e-services

- No. of public registers with improved interoperability

- No. of entities using ICT

- No. of people covered by training / consulting in the field of digital competences

- No. of ICT systems launched in entities performing public tasks

- No. of documents containing public sector information available on-line

- No. of downloads/playbacks of documents containing public sector information

- No. of downloads/launches of applications based on the reuse of public sector information and public e-services

- No. of databases available on-line via API

- No. of digitised documents containing public sector information

- No. of public organisations involved

- No. of enterprises supported during the project

- No. of e-services supporting the cooperation of scientific units with the economy

- No. of newly created jobs

- No. of educational institutions (schools and kindergartens) launching fully automated electronic teaching services

- No. of entities providing intra-administrative services (A2A)

- No. of research and teaching employees using the e-service supporting their cooperation with the environment

- No. of processes related to the provision of e-services

- No. of public registers with improved interoperability

- No. of public services available on-line with a maturity level of at least 4 - transaction

- No. of jobs maintained [FTE]

- No. of created APIs [pcs.]

- No. of users of innovative tools to improve digital skills and increase digital activity

- No. of users of innovative tools to improve digital skills and increase digital activation from Ukraine with the Pole's Card

- No. of permits issued by the managing authority to use an electronic journal as the only form of record keeping

- Server room disk space

- Size of public sector information available online

- Size of digitised public sector information

- Providing digital geodetic and cartographic resources

- No. of new digital educational services

- New local authorities (or groupings) transmitting their acts by dematerialised means

- No. of new digital cultural services

- No. of projects to make public services available online

- No. of public administration services supported

- No. of new functionalities of the information system

- No. of new digital public services (e-service) created and/or improved for the people of Aquitaine

- No. of digital use development projects supported

- No. of connected public entities

- No. of Service User Entities or Offices at the end of the project

- No. of applications usable by enterprises, citizens, operators

- No. of users accessing or covered by eGovernment applications/services

- No. of teletransferable procedures created or improved by the operation

- Development and implementation of asset management information system

- No. of asset management software licenses acquired

- Percentage of individuals aged between 16 and 74 who have filled in and submitted official forms in the last 12 months, of total individuals

- No. of enterprises with 10 or more employees that used the internet to interact with organisations entities and public authorities, as a proportion of all enterprises

- Population served by the entity(ies)

- Population served by the operation

- No. of services and applications developed and put online

- No. of digital territorial programme developed

Some of these indicators are used by more than one Member State that provided completed data on relevant project, in particular:

- 'No. of registers/service created' used by BE, EE, EL, FR, IT, LT, MT, PL.

- 'No. of users (citizens using the service)' used by, EL, ES, IT, LT, MT, PL, RO;

- 'Total population covered by the e-service/register' adopted by BE, IT, LT, MT,PL.

Area 3: Environment

Sub-area 3.1

Overview of the data

For sub-areas 3.1, we received data from nine Member States.

As illustrated in the table below some records were excluded as they refer to ongoing or irrelevant projects (see IT and SI). In total only three Member States (CZ, EL, PT) provided data on relevant and completed projects including total costs and at least one indicator.

Table 43 – Sub-area 3.1: overview of the data

Member State	No. of OP	No. of records received			
		Total	Relevant and completed	AND with data on total costs	AND with indicators' values
BG	1	7	4	4	-

Member State	No. of OP	No. of records received			
		Total	Relevant and completed	AND with data on total costs	AND with indicators' values
CZ	1	2	1	1	1
EL	2	51	30	30	30
FI	1	8	5	5	-
IT	1	1	-	-	-
LT	1	1	1	1	-
PL	2	3	-	-	-
PT	1	3	2	2	2
SI	1	1	-	-	-
TOT	10	77	43	43	33

Source: Consortium

Costs

There is only partial data on the type of activity/cost financed, as not all Member States provided this information. Costs funded by at least three Member States are: 'purchase, installation and maintenance of IT equipment' and 'project management costs' (see table below).

Table 44 – Sub-areas 3.1: cost categories

Member State	Purchase, installation and maintenance of IT equipment	Project management costs
BG		✓
CZ	✓	✓
EL	✓	
FI		
LT	✓	
PT	✓	✓

Source: Consortium

Outputs and results

Monitoring outputs and results differ across the three Member States (CZ, EL, PT) who provided data on relevant and completed projects, costs, and on at least one indicator

The only indicator used by two Member States is 'no. of solutions created', by CZ and EL. Greek authorities also use the common indicator CO18 'Additional population served by improved water supply' while Portuguese authorities use programme-specific indicators monitoring the water bodies and hydro-meteorological stations covered.

Sub-area 3.2

Overview

For sub-area 3.2, we received data from 12 Member States.

As illustrated in the table below, despite similar numbers of OPs the number of projects varies by Member State.

Table 45 – Sub-area 3.2: overview

Member State	No. of OPs	No. of records received			
		Total	Relevant and completed	AND with data on total costs	AND with indicators' values
BG	1	8	-	-	-
EE	1	5	-	-	-
EL	3	34	20	20	20
ES	3	30	1	1	1
FR	1	2	-	-	-
HU	1	21	-	-	-
LT	1	1	1	1	1
MT	1	5	2	2	2
PL	8	235	73	73	73
PT	1	17	11	11	10
SI	1	1	1	1	1
RO	1	31	-	-	-
TOT	23	390	109	109	108

Source: Consortium

Some records were removed since they refer to ongoing projects or operations not relevant to the sub-area. For example, some records from EL, ES, and PL were excluded since they refer to projects for water treatment plants.

108 records from seven Member States refer to completed and relevant projects and include data on total costs and indicators.

Costs

The eligible costs differ significantly by Member State, with more than 60 unique activities listed by the OPs. Activities funded by at least three Member States are presented below.

To address this, the study consolidated similar cost categories. Details of this aggregation are listed below.

Equipment and construction works

- Supplies

- Equipment

- Execution of construction works regarding the modernization of the water treatment plant

- Pipelines

- Construction/modernization of a water intake

- Construction works, expansion and reconstruction

Other categories of costs

Technical documentation and supervision

- Technical Project and Construction Supervision Service

- Technical documentation

- Documentation of the Modernization of the Water Treatment Plant

- Documentation of the water supply network

- Supervision of the modernization of the water treatment plan

Project preparation and promotion

- Communication

- Promotion

- Preparatory work

External services (including expert consultancy)

- Consulting

- Provision of services to enhance an intervention area of the management plan for the hydrographic basin of Furnas lake

- Cost of services related to professional activities

Table 46 – Sub-areas 3.2: cost categories

Member State	Equipment and construction works	Repair and rehabilitation costs	Technical documentation and supervision
EL	✓		
ES	✓		
LT	✓	✓	
MT	✓		
PL	✓	✓	✓
PT	✓		✓
SI	✓		

Source: Consortium

Most Member States reference the general category 'construction of the water infrastructure'; this category includes costs for the purchase and installation of the pipe, including trenching, excavation; embedment, etc.

Output and results

The approach to monitoring outputs and results differs by Member State. There are over 11 indicators to monitor operations on constructing/modernising drinking water infrastructure.

The box below lists indicators that provided information on completed projects.

Indicators sub-area 3.2

- Additional population served by improved water supply (CO18)

- Additional residents receiving better water supply

- Daily capacity of constructed water intakes [m3/day]

- Increasing the number of inhabitants with guaranteed safe access to healthy drinking water

- Length of the constructed water supply network [km]

- Lenght of the improved drinking water infrastructure [km]

- Length of the rebuilt water supply network [km]

- No. of solutions created

- No. of water intakes constructed [units].

- No. of people using the improved water supply

- Increasing the number of inhabitants with guaranteed safe access to healthy drinking water

Some of these indicators are used by more than one Member State which provided completed data on relevant projects, in particular:

- The common ERDF/CF output indicator 'CO18 - Additional population served by improved water supply' adopted by EL, ES, MT, PL, PT'

- Programme-specific output indicator 'Length of the drinking water infrastructure' is used by EL, ES, LT, MT and PL.

Sub-area 3.3

Overview of the data

The table below provides an overview of the data for sub-area 3.3.

Table 47 – Sub-area 3.3: overview

Member State	No. of OPs	No. of records received			
		Total	Completed	AND with data on total costs	AND with indicators' values
BG	2	30	30		
DE	1	2	2		
FI	1	1	1	1	1
EL	1	7	7 to be completed in 2023	7	7
SK	1	1	1	1	1
TOT	6	41	41	9	9

Source: Consortium

Thus, we received data on sub-area 3.3 from five Member States (BG, DE, FI, EL, SK). As illustrated in the table above, the number of records (each covering one project) varies by Member State.

Even though sub-area 3.3 data for six ERDF/CF OPs was provided by five Member States, there were only nine relevant records on specific green roof projects from three Member

States – FI, EL and SK[16] . Managing authorities from BG[17] provided data on environmental projects, but this did not include costs, or outputs for the installation of green roofs. Descriptions of the activities also did not show that green roofs were implemented. Therefore, data from BG is not considered feasible for this study. Data from DE was also not relevant as it reflected amounts of grants that did not cover all the costs for installing green roofs. In addition, some countries (BE, SK) mentioned green roof projects as being forward-looking and, therefore, ongoing (with no data) or to be included in 2021-2027 programmes.

The lack of data occurred due to the following reasons[18]:

- projects not completed (forward-looking area) and Members States do not have data yet;

- projects are completed but Member States do not have data (inconsistency in collecting data);

- national authorities did not have time to prepare data for this research;

- projects were implemented under the umbrella of large projects, therefore it was not possible to provide accurate data on installation of green roofs;

- projects were implemented using private funding and data is not publicly available. Collection of data from private investment was outside of the scope of this study.

As 24 Member States did not provide any relevant data, data extrapolation was needed. However, after a careful consideration of the gathered data (including follow-up questions for the national authorities) it became clear that data represent 3 separate types of green roof projects and, therefore, are not compatible. Thus, instead of the extrapolation, researchers proposed 3 green roof models and accordingly estimated their values for the rest of the Member States (see 2.3.3).

Costs

Data collection forms covered costs supporting the installation of green roofs. Even though historical data were missing from most Member States, quality-wise, key data from FI, EL and SK to develop an SCO were provided in the requested format, though covering activities to varying degrees. The table below provides an overview of the costs (qualitative data).

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[16] As stressed in the project description, Slovakia funded only extensive green roofs with restrictive financing which was limited to a few eligible expenditures, so some costs in all or most cases, such as structural strengthening of the roof to bear the heavy weight of the soil, etc. were not funded (and no data are available). This information provided by Slovakia explained the lowest cost/m2 for the installation of green roofs in Slovakia.

[17] According to the representatives, the construction of green roofs is still not widespread in Bulgaria, and is carried out by private investors with their own financing, not with financing from European funds.

[18] Authors assumptions based on the contacts with national authorities.

Table 48 – Sub-area 3.3: cost categories

Member State	Preparation plans	Construction	Implementation, other than materials	Equipment/material	Plants/seeds	Maintenance	Project management	Monitoring and evaluation	Freight of materials
FI	✓	✓	✓	✓	✓			✓	✓
EL		✓		✓	✓	✓			
SK		✓		✓	✓		✓		

Source: Consortium

On the basis of the data it is possible to make an initial analysis of the type of activities. Two Member States – EL and SK - covered the same number of cost types (4) while FI provided seven types. Regardless of three overlapping standard activities (compared to costs in the data collection form) – construction, equipment/material and plants/seeds - the data for activities differed across all three Member States.

FI provided additional data on a) preparation plans; b) implementation costs, other than materials[19], c) freight of material[20], and d) monitoring and evaluation[21]. The remainder – a) maintenance, and b) project management costs[22] were used by EL and SK accordingly.

To calculate SCO options, the study team proposed two overlapping activities – construction and equipment/material, while unique measures (monitoring and evaluation, and maintenance) were deducted from the total costs. After direct consultations with national authorities and careful investigation, preparation plans (FI), implementation, other than materials (FI), and project management costs (SK) have been included in construction. Also, plants/seeds (FI, EL, SK) and the freight of materials (FI) are part of equipment/material.[23]

All three Member States not only provided qualitative information on the type of eligible costs but also specified the costs for each category. Even if the amounts varied by Member State, relevant categories were:

- Construction costs (including preparation plans, implementation, other than materials, project management);

- Equipment/material (including plants/seeds[24] and freight of materials).

It is also worth noting that green roofs are usually facilitated in two ways:

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[19] FI used a non-standard category 'Implementation costs, other than materials'. After consultation with the national expert, this seems very similar or the same as 'Construction costs'.

[20] Non-standard category mentioned by the national authority.

[21] Non-standard category mentioned by the national authority.

[22] Non-standard category mentioned by the national authority.

[23] This is a very natural allocation of the category as, for example, in Finland the plant/seeds category seemed to also include building surfaces (which is part of the equipment/material category) in the costs of the delivery.

[24] This is a very natural allocation of the category as, for example, in Finland the plant/seeds category seemed to also include building surfaces (which is part or the equipment/material category) in the costs of the delivery.

- extensive green roofs (natural low maintenance);

- intensive green roofs (parks and gardens including Urban Agriculture).

This distinction has an impact on the cost of installation and, therefore, was important for the calculation of SCO options. Installation and maintenance costs of extensive green roofs are generally lower than those for intensive green roofs[25], as shown by SK[26].

Output and results produced according to collected data

In terms of monitoring outputs and results, the approach adopted by the Member States is similar. Of the three Member States that provided data on green roof projects, all used one key indicator: *surface of the green roof installed in m2.*

Data from alternative sources

In addition to the historical data, our study team carried out research of alternative sources. Even though collected data did not include the key points for the development of SCOs, it was used to better understand the context and could be potentially operated in the future research.

Databases

Two databases for green roof projects have been identified. Firstly, the global database of green roofs[27] includes approximately 150 EU-based projects. However, it mainly provides the size of green roofs installed and short descriptions of the projects. There is no detailed information on funding, activities, costs and outcomes. Table 49 shows the Member States that registered green roof projects in the database, but this may not be accurate data. Information could cover projects linked to green infrastructure (not only green roofs) and there may be inconsistencies in search results and map data. The database includes European regions and Member States that implemented green roof projects. In descending order, these are Benelux, ES, DE, DK, IT, IE, SW, PL, and PT. However, it was not relevant to this research as it could not provide details of activities, costs or outputs.

The 40 exemplar projects of the European Federation Green Roofs and Walls include (see Table 49):

- Biodiverse roofs: seven, of which two were extensive and four intensive in CZ, DE, PT, and HU;

- Extensive roofs: 15/13 green roofs (two are biodiverse) in PL, SW, NL, AU, CZ, PT, IT, and BE;

- Intensive roofs: 25/20 green roofs in PO, CZ, PT, IT, DE, HU, SW and FR (four are biodiverse and one is extensive).

Even though the list of exemplar projects does not cover most European projects, it may highlight tendencies and best practices across the EU. Member States with the most exemplar projects were:

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[25] https://adriadapt.eu/adaptation-options/green-roofs/.

[26] SK data showed lower values than other Member States (EL and FI). This could be explained by less demanding vegetation roofs, and fewer eligible expenditures (e.g, excluding preparation of the roof).

[27] www.greenroofs.com

- Portugal (8)

- Czechia (7)

- Germany (6)

- Poland (5)

- Austria, Italy, Sweden (3 each)

- Hungary (2)

- Belgium, Finland, the Netherlands (1 each).

In comparison with the other database, most Member States were overlapping including DE, BE, NL, IT, PL, SW and PT. However, neither the global database nor the European Federation of Green Roofs and Walls provided any data on activities, costs or outputs for the green roof projects.

Table 49 Overview of data from alternative sources

Member State	Installation of green roofs	
	Member States with projects registered[28]	NO. of projects[29]
AT		3
BE	x	1
CZ	x	7
DE		6
DK	x	
ES	x	
FR	x	1
EL	x	
HU		2
IE	x	
IT	x	3
NL	x	1
PL	x	5

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[28] http://www.greenroofs.com/projects/.

[29] http://www.efb-greenroofs.eu/exemplar-projects/.

Member State	Installation of green roofs	
	Member States with projects registered[28]	NO. of projects[29]
PT	x	8
SE	x	3

Source: Consortium

Evaluations of green roof costs

Based on experience in Germany (2016-2017), costs (including gravel strip and gravel edging service positions) for most extensive green roofs were EUR 40-45/m^2, while intensive green roofs cost about EUR 58/m^2 (Hamburg's green roof economic evaluation).[30] This data needs recalculating to current price levels. Notably, large-scale installations of green roofs could slightly reduce the final costs (due to discounts from suppliers).

The study of Hamburg's green roofs is also important as it explains contextual factors that may impact installation costs. These are distributed among a) individual components (type of green roof, gravel strip and gravel edging service positions, residential complex size), and b) price differences between suppliers.[31]

In 2019 the cost of a traditional flat roof varied from EUR 80 to 100/m2 depending on the roof covering and insulation, while a green roof ranged from EUR 140 (extensive) to EUR 250/m2 (intensive)' (Perini and Rosasco, 2019).[32] This data also shows the possible range of costs for installing green roofs as EUR 60/m2 to 150/m2. However, these values from 2019 should also be recalculated to current price levels.

Subsidies and grants for green roof installation

Some Member States used financial instruments such as subsidies and grants to support the installation of green roofs. Grant/subsidy data may assist in the calculations of total costs for installing green roofs. Barcelona City Council launched a green roofing competition in June 2017 with a grant of 75% of the cost, up to EUR 100,000 for the 10 winning projects. An investment of EUR 1.5 million led to 4,000m2 of green spaces on the city's rooftops.[33]

The Hamburg Ministry for Environment and Energy offered EUR 3 million to subsidise 30 to 60% of installation costs (2014-2024). Basic green roofs received a basic subsidy, more specialised roofs receive additional subsidies.[34] This suggests distinguishing (if possible) the costs for different types of green roofs when conducting calculations.

The Green Roof Strategy for Hamburg (the first German city to develop a comprehensive Green Roof Strategy) aims to green at least 70% of new buildings and suitable flat or gently pitched roofs being renovated. This totals 100 hectares (1 000 000 m2) of roof surface

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[30] A price comparison of offers for an extensive green roof was some EUR 300/m² in a call for proposals from 2016. https://climate-adapt.eea.europa.eu/en/metadata/case-studies/four-pillars-to-hamburg2019s-green-roof-strategy-financial-incentive-dialogue-regulation-and-science/#adapt_options_anchor; d-economic-evaluation.pdf (hamburg.de)

[31] https://climate-adapt.eea.europa.eu/en/metadata/case-studies/four-pillars-to-hamburg2019s-green-roof-strategy-financial-incentive-dialogue-regulation-and-science/#adapt_options_anchor; d-economic-evaluation.pdf (hamburg.de)

[32] Green roofs - AdriAdapt .

[33] Green roofs - AdriAdapt.

[34] Four pillars to Hamburg's Green Roof Strategy were financial incentive, dialogue, regulation, and science; https://climate-adapt.eea.europa.eu/en/metadata/case-studies/four-pillars-to-hamburg2019s-green-roof-strategy-financial-incentive-dialogue-regulation-and-science.

covered with plants and flowers in the metropolitan area.[35] Since 2014, when the Green Roof Strategy was launched, about 44 hectares of green roofs have been implemented. At least EUR 13.5 million have been invested in these green roofs over the past six years, of which EUR 1.5 million is public funding from the Green Roof Strategy incentive programme.

This data from subsidies/grants schemes in Spain and Germany could assist in estimating green roof installation cost/m2. When (and if) used, these values have to be recalculated to current price levels.

Green roof projects under the umbrella of large projects

Analysis of alternative sources (e.g. DK) and historical data (e.g. BG) showed that green roof projects were often part of larger environmental projects. Therefore, in many cases only data on total costs were available. For example, in Denmark's project '8-House', two sloping green roofs totalling 1,700 m2 were strategically placed to reduce the urban heat island effect. Even though data on roof area was clear – 1,700 m2 of extensive roof and 100 semi-intensive gardens of a square metre each, the build cost of EUR 92 million[36] concerned the whole project not just the installation of green roofs.

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35 Four pillars to Hamburg's Green Roof Strategy: financial incentive, dialogue, regulation, and science — English (europa.eu)

36 https://www.klimatilpasning.dk/media/631048/green_roofs_copenhagen.pdf.

Annex 4 – Survey Results

Area 1: Health

For Area 1, 13 Member States funded relevant interventions. HU and SI instead exclusively funded such projects through ESF resources. In particular, looking at the three sub-areas under 'Health':

- '1.1 Development and use of uniform electronic health care information system' was funded by 25 ERDF/CF OPs in 13 Member States excluding HU which exclusively funded such projects through ESF resources.

- Projects related to '1.2 New digital primary care services to improve patient access to health care' were funded by 19 ERDF/CF OPs in 9 Member States excluding RO which exclusively funded such projects through ESF resources.

- '1.3 Purchase of personal protective equipment necessary to address emergency situations' was funded under 39 OPs in 11 Member States excluding HU and SI which exclusively funded such projects through ESF resources.

Table 50 – Survey results for Health policy

MS	1.1 Development and use of uniform electronic health care information system	1.2 New digital primary care services to improve patient access to health care	1.3 Purchase of PPE to address emergency situations
AT	No	No	No
BE	1	1	No
BG			
CY	No	No	No
CZ	No	No	No
DE	No	1	No
DK	No	No	No
EE	1	1	1
EL	1	No	2
ES			
FI	1 + Interventions funded by a national scheme	1	No
FR	3	5	18

MS	*1.1 Development and use of uniform electronic health care information system*	*1.2 New digital primary care services to improve patient access to health care*	*1.3 Purchase of PPE to address emergency situations*
HR	1	No	1
HU	1 (ESF OP Human Resources Development)	No	1 (ESF OP Human Resources Development)
IE			
IT	1	No	2
LT	1	1	1
LU	No	No	No
LV			
MT	1	1	1
NL	No	No	No
PL	11	7	9
PT	1	1	2
RO	1 + OP Administrative Capacity (ESF)	OP Administrative Capacity (ESF)	1
SE	No	No	No
SI	No	No	1 (ESF resources)
SK	1	No	1 + large capacity of vaccination centres funded by national resources

Source: Consortium

Area 2: ICT

17 of the 22 Member States which provided information funded at least one intervention within Area 2. Looking at each of the five ICT sub-areas:

- '2.1 Promoting e-services for SMEs' was funded by 23 ERDF/CF OPs in 16 Member States.

- '2.2 Raising the digital security profile of SMEs' was funded by 15 ERDF/CF OPs in 10 Member States.

- '2.3 Developing Inter-connection registers with a view of implementing the once-only principle' was funded by 17 ERDF/CF OPs in 12 Member States.

- '2.4 Developing services to fulfil essential requirements of a life event' was funded by 18 ERDF/CF OPs in 9 Member States excluding SI which exclusively funded such projects through ESF resources during the 2007-2013 programming period.

- '2.5 Development of e-service application' was funded by 24 ERDF/CF OPs in 13 Member States excluding SI which exclusively funded such projects through ESF resources during the 2007-2013 programming period

Table 51 – Survey results for the ICT policy area

MS	2.1 Promoting e-services for SMEs	2.2 Raising the digital security profile of SMEs	2.3 Developing Inter-connection registers to implement the once-only principle	2.4 Developing services to fulfil essential requirements of a life event	2.1 Promoting e-services for SMEs
AT	No	No	No	No	No
BE	1	No	1	No	1
BG					
CY	1	No	No	No	No
CZ	No	1	1	1	1
DE	1	No	No	No	No
DK	No	No	No	No	No
EE	1	No	1	1	1
EL	2	No	1	No	2
ES					
FI	1	1	No	No	1
FR	At least 1	No	No	At least 2	At least 2
HR	1	No	1	No	No
HU	No	No	No	No	No
IE					
IT	1	1	No	No	1
LT	1	No	1	1	1

MS	2.1 Promoting e-services for SMEs	2.2 Raising the digital security profile of SMEs	2.3 Developing Inter-connection registers to implement the once-only principle	2.4 Developing services to fulfil essential requirements of a life event	2.1 Promoting e-services for SMEs
LU	No	No	No	No	No
LV					
MT	1 + Malta RRF	1	1	1	1
NL	No	1	No	No	1
PL	7	6	5	7	11
PT	1	1	2	4	No
RO	1 + OP Administrative Capacity (ESF)	1	1	1	1+ OP Administrative Capacity (ESF)
SE	No	No	No	No	No
SI	1	1	1	1 (ESF resources 2007-2013)	1 (ESF resources 2007-2013)
SK	1	1	1	1	1

Source: Consortium

Area 3: Environment

For environment-related interventions, 16 Member States funded interventions relevant to Area 3. Analysis of coverage for each sub-area revealed that:

- '3.1 Developing digital solutions/applications to improve monitoring & management of drinking water sources' was financed under 20 ERDF/CF OPs in 10 Member States excluding RO which exclusively funded such projects through ESF resources.

- '3.2 Constructing/modernising drinking water infrastructure' was funded by 28 ERDF/CF OPs in 14 Member States.

- '3.3 Installing green roofs' was funded by 13 ERDF/CF' OPs in 7 Member States.

Table 52 – Survey results for the Environment policy area

MS	3.1 Developing digital solutions/applications to improve monitoring & management of drinking water sources	3.2 Constructing/modernising drinking water infrastructure	3.3 Installing green roofs
AT	No	No	No
BE	No	No	No
BG			
CY	No	No	No
CZ	2	1	1
DE	No	No	1
DK	No	No	No
EE	No	1	No
EL	3	4	1
ES			
FI	1	No	1
FR	No	At least 1	4
HR	No	1	No
HU	No	1	No
IE			
IT	1	1	No
LT	1	1 + Interventions funded by Lithuanian environmental protection investment fund	No
LU	No	No	No
LV			
MT	No	1	No
NL	1	No	No
PL	7	11	3
PT	2	2	No

MS	3.1 Developing digital solutions/applications to improve monitoring & management of drinking water sources	3.2 Constructing/modernising drinking water infrastructure	3.3 Installing green roofs
RO	OP Administrative Capacity (ESF)	1	No
SE	No	No	No
SI	1	1	No
SK	1	1 + Environmental fund (national scheme)	2

Source: Consortium

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