

## D4.2 Short-Term Trainings

Training methodologies, curricula, and instructional materials for Short-Term Trainings



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<b>Description</b>	The deliverable includes a clearly defined detailed training methodology, as well as clear curricula for short-term both trainings (for resilient smart communities' solutions engineer, as well as public procurers working with smart communities solutions). In addition, it will include a set of learning materials (available through the provided hyperlinks to all available resources).
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## Document history

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3	21.11.2025	Konstantinos Kirytopoulos	Expert review
4	24.11.2025	Teresa Lessa – FORAVE Manuela Giumarães – FORAVE	Expert review
5	28.11.2025	Evija Trusaite – Cefriel	Final review ready for submission

## Abbreviations

Acronym	Explanation
CA	Consortium Agreement
WP	Work Package
EQF	European Qualifications Framework
ESCO	European Skills, Competences, Qualifications and Occupations
LMS	Learning Management System
SCRE	Smart Community Resilience Engineer

<b>SCR</b>	Smart Community Resilience Solutions Procurer / Planner
<b>SAM</b>	Successive Approximation Model
<b>ADDIE</b>	Analysis Design Development Implementation Evaluation
<b>MCQ</b>	Multiple Choice Question

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## 1. Work Package 4

Work Package 4 of the SMARCO project aims to develop and pilot **urgent short-term training programs** addressing immediate competence gaps in the smart community's sector.

The WP focuses on two key target profiles: **Smart Community Resilience Engineers (SCRE)** and **Smart Community Resilient-solutions Planners/Procures (SCRCP)**. The main activities include creating a comprehensive competence matrix learning outcomes for both profiles, designing an agile and effective training methodology and preparing two structured curricula. These curricula are supported by a wide range of learning materials, including both existing and newly developed resources such as articles, presentations, multimedia content, and case studies.

WP4 also foresees the development of concise **train-the-trainer guidelines** to ensure that both academic and business trainers are equipped to deliver the courses effectively.

The short-term training programs will be piloted in industrial and public administration settings across at least **five countries, targeting a minimum of 150 trained professionals**. Feedback from trainers and learners will be systematically collected and used to update the curricula and materials, ensuring alignment with market needs and enhancing the overall impact of the training

### 1.1 Scope of deliverable 4.2

Deliverable 4.2 provides a clearly defined and detailed **training methodology**, as well as the full curricula for both short-term training programs—one for SCRE and one for SCRCP. It also includes a comprehensive set of **learning materials**. D4.2 is designed to be a practical, public-facing resource that enables rapid deployment and adaptation of the training courses by various stakeholders. The deliverable is first made available by month 10 of the SMARCO project and is subsequently updated, incorporating feedback from the piloting phase to ensure that the training offer remains relevant and effective for the evolving needs of the sector.

## 2. Introduction

### 2.1 Relation to Other Deliverables and Work Packages

D4.2 is included in WP4 and is based on earlier work related to the competence matrix (D4.1) and its Appendix and the analysis of stakeholder needs (WP2). It involves the **creation of curricula, assessment techniques, blended learning strategies and learning materials**. This deliverable also provides input for future activities such as course delivery and evaluation.

### 2.2 From European Skills Gap Analysis to the Definition of Key Competences

The training offer is based on a **gap analysis** of the European smart communities market, as outlined in the project application and interim results. The analysis used desk research, stakeholder surveys and expert focus groups to **identify skills relevant to industry professionals and public sector personnel**.

Results indicated a difference between the requirements of digital and green transitions and the existing workforce skills. Specifically, up-to-date occupational profiles and training programs addressing the integration of digital, green, and resilience competences—including cybersecurity, sustainability, IoT, AI, data analytics, and innovative procurement—were found to be lacking.

Building on this evidence, **SMARCO developed two new occupational profiles: Smart Community Resilience Engineer** and the **Smart Community Resilient-solutions Procurer/Planner**. For each profile, a competence matrix was created (D4.1), specifying the knowledge, skills, and responsibilities required, aligning them with European frameworks (EQF, ESCO). The learning outcomes were defined to be clear, measurable, and directly linked to the needs of the labour market, ensuring that the training programs would be both relevant and future-proof.

### 2.3 Target Audiences

The short-term courses are designed for:

- Workers, students, and job seekers interested in Smart Communities;



- Entry level: EQF 5 (basic level required to participate);
- The courses are suitable for both professionals seeking upskilling and individuals entering the field.

## 2.4 Work Methodology

To reach the conclusions presented in this deliverable, the project partners engaged in a collaborative process that took place during a dedicated workshop held on the Miro platform. This session provided an interactive space for discussion, idea sharing, and joint analysis, enabling participants to collectively refine the project's findings and align on the final outcomes reported herein.

## 3. Training Methodology and Pedagogical Approach

SMARCO project embraces a learner-centered training methodology aimed at bridging the most pressing skill gaps within the smart communities ecosystem. This pedagogical framework is specifically tailored to meet the distinct needs of two primary target audiences: SCRE and SCRP.

### 3.1 Core Pillars of the Methodology

- **Blended Learning and Multimodal Delivery:**

The training model combines self-paced learning modules, live virtual or in-person sessions and self-assessment resources. This hybrid approach fosters both individual autonomy and collaborative knowledge building, enabling participants to learn anytime, anywhere, and apply acquired skills in practical contexts.

- **Continuous Feedback and Iterative Improvement:**

SMARCO methodology incorporates systematic feedback loops involving learners and trainers. Insights gathered throughout the learning process are analysed to refine curricula, enhance content relevance and update pedagogical strategies, ensuring that training materials evolve in tandem with technological and societal transformations.

- **Inclusivity, Accessibility and Diversity:**

The program is designed according to universal design for learning (UDL) principles<sup>1</sup>, promoting equitable access for participants from diverse backgrounds, cultures, and prior experience levels. Learning materials are optimized for accessibility, supporting different learning styles and ensuring that all participants can fully engage with the content.

- **Competence-Oriented and Practice-Based Learning:**

Emphasis is placed on hands-on, problem-solving activities that connect theoretical knowledge with real-world applications. Learners are encouraged to work on case studies, simulations, and collaborative projects, developing critical thinking, innovation, and digital transformation skills relevant to the smart community domain.

Through this dynamic and inclusive pedagogical approach, SMARCO project aims to empower professionals to drive sustainable, data-driven and citizen-centered innovation within smart communities.

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<sup>1</sup> *Universal Design for Learning (UDL) is an educational framework developed by the Center for Applied Special Technology (CAST) that aims to make learning accessible and effective for all students by minimizing barriers in the learning environment. UDL is based on three core principles: (1) providing multiple means of representation to address diverse ways of perceiving and understanding information; (2) providing multiple means of action and expression to allow students to demonstrate their knowledge in various ways; and (3) providing multiple means of engagement to foster motivation and interest. Together, these principles promote flexibility, inclusivity, and learner autonomy within educational design.*

## 3.2 Instructional Design Model

For the **short-term courses**, the project uses **Successive Approximation Model (SAM)**<sup>2</sup>, a simplified and agile version of the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). SAM is particularly suited for contexts where time constraints are pressing and rapid iteration is needed.

The model involves four main steps:

1. **Preparation:** Define learning objectives, target audience, and core content;
2. **Iterative Design:** Develop and test prototypes of learning activities and materials, incorporating feedback at each stage;
3. **Development:** Create the full set of learning resources, including multimedia, assessments, and case studies;
4. **Implementation and Evaluation:** Pilot the course, gather feedback, and refine the materials and approach as needed.

## 3.3 Learning Objectives and Outcomes

Learning objectives and outcomes are defined for each profile's courses and are:

- **Clear and measurable:** Each course specifies what learners should know, understand and be able to do upon completion;

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<sup>2</sup> The Successive Approximation Model (SAM) is an agile instructional design framework developed by Michael Allen and Allen Interactions. Unlike the traditional ADDIE model, SAM emphasizes rapid, iterative design and development through continuous prototyping and feedback.

- **Competence-based:** Outcomes are aligned with the European Qualifications Framework (EQF) and ESCO occupational profiles, covering knowledge, skills, responsibility, and autonomy;
- **Relevant to market needs:** Objectives are based on a comprehensive needs analysis and are regularly updated to reflect evolving trends in smart communities, sustainability, and resilience;
- **Structured for progression:** Both core (compulsory) and specialized (optional) competences are included, allowing for flexible learning pathways.

## 4. Curriculum Overview

### 4.1 Course duration and structure

The short-term SMARCO training program offers a flexible pathway for quick upskilling in smart communities. Each **4-hour module** covers theory, in-depth topics, and assessments. The training is delivered in a blended format with self-learning materials and live sessions, accessible to professionals and public sector staff across Europe.

Each module includes:

- **2.5 hours** of self-study (slides, readings, case studies)
- **1 hour** of live session (interactive class or webinar)
- **0.5 hours** dedicated to assessment (quizzes, multiple-choice questions)

For each of the six modules, a comprehensive **training package** has been developed, consisting of approximately 60 slides. Each package is structured into three distinct **learning units**, designed to progressively deepen participants' understanding of the module's core themes. Every unit concludes with a **multiple-choice assessment questionnaire**, enabling learners to consolidate their knowledge, reflect on key concepts, and monitor their own learning progress in a structured and autonomous way.

To facilitate the creation and administration of these assessment activities, three online tools were identified as particularly suitable within the framework of this Intellectual Output: *Wooclap*, *FlexiQuiz* and *Moodle Learning Management System (LMS)*:

- *Wooclap* allows the development of interactive multiple-choice quizzes with real-time feedback and visual analytics, fostering active engagement and participation. It integrates smoothly with presentation software and Learning Management Systems (LMS), making it ideal for educational and training contexts;

- *FlexiQuiz* provides a versatile quiz-making environment that supports different question types, automated grading, time limits, and customizable branding and access options;
- *Moodle*, as an open-source LMS, offers a robust environment for the creation, distribution, and monitoring of multiple-choice questionnaires (MCQs) within structured courses. It enables centralized management of assessment activities, automatic grading, and detailed performance tracking, ensuring alignment with the overall pedagogical design of each module.

All three platforms are **compliant with EU data protection regulations (GDPR)** and can be selected according to the required level of interactivity, automation, and integration within each module. The selection of the platform to be used for MCQ delivery, as well as the platform for hosting and sharing the learning materials (potentially the SMARCO project website), will be further evaluated in the next steps by the project partners.

In addition to the slides and questionnaires, a **supplementary resource document** is provided for each module, including extended readings, case studies, and reference materials that encourage independent exploration of the topics. All materials were collaboratively produced by the partners involved in **Task 4.2**, and harmonized into a consistent format to ensure **quality, coherence, and accessibility** across all training components.

## 4.2 Target Profiles

### 4.2.1 Smart Community Resilience Engineer



Figure 1 – Smart Community Resilience Engineer Persona

A **SCORE** is responsible for designing, developing, and implementing digital and sustainable solutions for smart communities. This professional works at the intersection of technology, sustainability, and urban innovation, ensuring that ICT systems, IoT devices, data analytics, and AI-driven services are integrated to improve the quality of life, resilience, and sustainability of communities. Typical tasks include system design, cybersecurity management, deployment of IoT networks, data analysis for urban planning, and supporting digital and green transformation initiatives.

Following the gap analysis conducted during the preliminary phase of SMARCO project, the short-courses were strategically designed to focus on those key competencies identified as most critical and underdeveloped among professionals in the smart community domain. This targeted approach ensures that training interventions directly address real and urgent skill needs, fostering rapid upskilling and enabling participants to immediately apply newly acquired knowledge in professional contexts.

The original list of competencies identified in D4.1 and its Appendix has been streamlined to the following modules, based on the availability of materials and the expertise of the partners involved. This selection ensures that the training offer remains both robust and feasible, focusing on areas where high-quality resources and specialist input are guaranteed.

## Modules

- **Cybersecurity:** Fundamentals of protecting smart community infrastructures: implementing security frameworks, cryptographic solutions, risk assessment, incident response systems, and compliance with cybersecurity regulations;
- **Green Transition and Sustainability:** Managing smart energy sources, planning circular economy strategies, carbon emissions and footprint literacy, analysing sustainability challenges (environmental, social, economic), designing evidence-based sustainability policies, and monitoring organizational sustainability performance;
- **Internet of Things:** IoT architectures, device integration, data flows in smart environments, main communication technologies, cloud IoT platforms, and meaningful IoT applications for smart cities;



- **Artificial Intelligence:** Fundamentals of AI and machine learning, supervised and unsupervised techniques, algorithms for classification, regression, forecasting, and clustering in smart city contexts, including automation and predictive analytics for smart services;
- **Urban Data Analytics:** Techniques for collecting, securely managing, and analyzing urban data: data analytics, big data applications, tools and visualization techniques, outlier detection, algorithmic accountability, and supporting decision-making for urban governance;
- **Digital Transformation:** Strategies and tools for leading digital change: legacy system integration, selection and management of cloud services, automation, microservices, APIs, and management of digital infrastructures in public and private organizations.

### **Competences and Learning Outcomes**

Upon completion of the SCRE short course, participants will have developed a comprehensive set of technical, analytical, and transversal competences enabling them to design, implement, and manage innovative solutions within the framework of smart and sustainable communities. Learners will acquire both specialized knowledge and practical skills applicable across multiple sectors engaged in the digital and green transitions.

To achieve these learning outcomes, both professional profiles — SCRE and SCRP — are required to complete all modules of the short-term training program. This ensures a holistic understanding of the thematic areas covered and guarantees a consistent competence framework across all participants.

## 4.2.2 Smart Community Resilient-solutions Procurer / Planner



**Figure 2 – Smart Community Resilient-solutions Procurer/Planner**

A **SCR** is responsible for the strategic planning, procurement, and management of smart community projects, with a focus on sustainability, digital innovation, and citizen-centric services. This profile typically works within public administrations or as consultants, ensuring that procurement processes align with green and digital transition goals, and that community needs are addressed through innovative solutions.

Following the gap analysis conducted during the preliminary phase of SMARCO project, the short courses for SCR designed to specifically address the **competence areas identified as most lacking or emerging** in relation to sustainable procurement, strategic planning and digital governance within smart communities. This **evidence-based and targeted approach** ensures that the training effectively bridges existing professional gaps, **enhancing participants' capacity to make informed, innovation-oriented, and sustainability-driven decisions** in real policy and procurement contexts.

### **Modules:**

- **Project Management:** Essentials of managing smart community projects: developing project plans aligned with strategic objectives, controlling scope, schedule, and budget, risk management, leading cross-functional teams, stakeholder engagement, and applying Agile/Scrum and SAFe (Scaled Agile Framework) methodologies;

- **Green Transition and Sustainability:** Sustainable procurement practices, integrating green criteria in public tenders, managing smart energy sources, circular economy strategies, evidence-based policy design, and monitoring sustainability performance;
- **Work with E-Services Available to Citizens:** Implementation and management of digital public services: evaluating platform effectiveness, integration strategies, analysing user barriers, improving accessibility and interoperability, and integrating with legacy systems;
- **Work with Communities:** Strategies for engaging communities: analysing cultural differences, trust-building techniques, inclusive processes, group dynamics assessment, synthesizing multiple perspectives, and effective stakeholder communication (materials provided for self-study);
- **Smart City Features:** Overview of key smart city technologies: analysing urban data systems, evaluating sustainability metrics, assessing environmental impact of urban technologies, and developing strategic implementation plans for smart solutions in urban and rural contexts (materials provided for self-study);
- **Promotion of Innovative Infrastructure Design:** Approaches to promoting and procuring innovative, resilient infrastructure: selecting sustainable technologies and materials, adaptive organizational frameworks, integrating digital solutions, and familiarity with digital information and service platforms.

## Competences and Learning Outcomes

Upon completion of the **Smart Community Procurer and Planner** short course, participants will have acquired the **strategic, managerial, and digital competences** necessary to design, implement, and oversee innovative and sustainable initiatives within smart communities. The learning outcomes reflect the growing need for professionals capable of linking **technological innovation, sustainable procurement**, and **participatory governance** in the development of smart territories.

This competence framework ensures that participants emerge as strategic enablers of innovation, equipped to drive digital transformation, sustainability, and participatory governance within the evolving landscape of smart communities.

Profile	Role & Responsibilities	Training Modules
<b>Smart Community Resilience Engineer (SCRE)</b>	<p>Designs, develops, and implements digital and sustainable solutions for smart communities at the intersection of technology, sustainability, and urban innovation.</p> <p><b>Key Tasks:</b></p> <p>System design, cybersecurity management, IoT network deployment, urban data analysis, digital and green transformation support.</p>	<p><b>Cybersecurity:</b> Infrastructure protection, security frameworks, risk assessment, incident response, regulatory compliance</p> <p><b>Green Transition &amp; Sustainability:</b> Smart energy management, circular economy, carbon footprint literacy, evidence-based policy design</p> <p><b>Internet of Things (IoT):</b> Architectures, device integration, data flows, communication technologies, cloud platforms, smart city applications</p> <p><b>Artificial Intelligence (AI):</b> ML fundamentals, supervised/unsupervised techniques, classification, regression, forecasting, clustering</p> <p><b>Urban Data Analytics:</b> Data collection and management, big data applications, visualization, decision-making support</p> <p><b>Digital Transformation:</b> Change management, legacy system integration, cloud services, automation, microservices, APIs, infrastructure management</p>

### Smart Community Resilient-solutions Procurer/Planner (SCRP)

Responsible for strategic planning, procurement, and management of smart community projects with focus on sustainability, digital innovation, and citizen-centric services. Works within public administrations or as consultant.

#### Key Tasks:

Ensuring procurement processes align with green and digital transition goals.

**Project Management:** Smart community project essentials, strategic alignment, risk management, stakeholder engagement, Agile/Scrum/SAFe methodologies

**Green Transition & Sustainability:** Sustainable procurement, green criteria in public tenders, smart energy management, circular economy, evidence-based policy design

**E-Services for Citizens:** Digital public service implementation and management, platform effectiveness evaluation, accessibility and interoperability improvement, legacy system integration

**Community Engagement:** Community strategies, cultural analysis, trust-building, inclusive processes, stakeholder communication (self-study materials)

**Smart City Features:** Key technologies overview, urban data systems analysis, sustainability metrics evaluation, strategic implementation plans (self-study materials)

**Innovative Infrastructure Design:** Promoting and procuring resilient infrastructure, sustainable technology/material selection, digital solution integration

## 4.3 Integration of Feedback from the Piloting Phase

The piloting phase constitutes a key step in validating the content and structure of the SMARCO short-term training programmes for both SCRE and SCRП profiles. The process ensures that the final training offer is fully aligned with learners' needs and the evolving requirements of the smart and sustainable communities sector.

### 4.3.1 Feedback Collection

**Feedback** will be collected through **structured online surveys** administered to participants at two levels:

- **Module-level surveys**, completed at the end of each module, will gather feedback on the clarity, relevance, and usability of the learning materials, as well as the effectiveness of the self-assessment activities and live sessions;
- **Course-level survey**, completed at the end of the entire short-term training, will capture participants' overall perceptions of the programme, including workload balance, learning experience, and applicability of the acquired competences.

### 4.3.2 Data Analysis

All survey responses will be compiled and jointly analysed by the project partners involved in Task 4.2. The analysis will combine quantitative indicators (e.g., satisfaction scores, perceived usefulness) with qualitative inputs (e.g., open-ended comments), allowing for a comprehensive understanding of participants' experiences across modules.

### 4.3.3 Integration into Final Materials

Based on the outcomes of this analysis, partners will identify specific areas for improvement and update the training materials accordingly. Adjustments may include:

- refinement of slides and readings to improve clarity or balance of content;
- revision of multiple-choice self-assessment questionnaires;
- addition of examples or short case studies to enhance applicability;
- minor updates to structure or sequencing of modules to optimise learning flow.

The updated version of the materials will constitute the final release of Deliverable 4.2, ensuring that the SCRE and SCRP short-term courses are fully validated, coherent, and ready for implementation and transferability to other contexts.

## 5. Conclusions

Deliverable D 4.2 presents a comprehensive framework for short-term training programs designed to address urgent skills gaps in the smart communities sector. The conclusions highlight several core achievements and insights:

1. **Strategic, Managerial, and Digital Competence Development**

Short-term courses enable participants—whether SCRE or SCRP to acquire the strategic, managerial, and digital competences needed to design, implement, and oversee innovative and sustainable initiatives within smart communities;

2. **Competence Framework for Innovation and Sustainability**

The document defines a competence framework that integrates technological innovation, sustainable procurement, and participatory governance. This ensures that professionals are equipped to drive digital transformation and sustainability in smart territories;

3. **Clear Learning Objectives and Outcomes**

The learning objectives and expected outcomes are clearly articulated, focusing on practical skills and knowledge directly linked to market needs. Participants emerge as strategic enablers of digital transformation and sustainability, capable of making informed decisions and fostering innovation in their organizations and communities;

4. **Alignment with European Standards and Market Needs**

The curricula and methodologies are aligned with European frameworks (EQF, ESCO) and based on a thorough gap analysis of the sector. This guarantees relevance, future-proofing, and adaptability to evolving trends in smart communities, sustainability, and resilience;

5. **Empowerment for Real-World Impact**

By completing these courses, professionals are empowered to actively contribute to the



digital, green, and social transformation of smart communities, ensuring coherence with local and regional development strategies and maximizing public value.



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