



Procurement Educational Consortium for Innovation-sourcing using Sustainability



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## **PRECIOUS**

**Procurement Educational Consortium for Innovation sourcing**

**Using Sustainability**

# **Intellectual Output 4**

**Designing principles for an open online course**



kaunas  
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technology



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OF TWENTE.**

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### List of Abbreviations

Abbreviation	Meaning
IO	Intellectual Output
PSM	Purchasing and Supply Management
SME	Small and Medium Enterprises
MOOC	Massive Open Online Courses
R&D	Research and Development
RQ	Research Question
SPSM	Sustainable Purchasing Supply Management
SC	Supply Chain

## Table of Contents

<b>Abstract .....</b>	<b>5</b>
<b>Introduction .....</b>	<b>6</b>
<b>1. Intellectual Output 4: Design of an online course .....</b>	<b>7</b>
1.1 Rationale.....	7
1.2 Challenge based learning integration into the course design .....	7
1.3 MOOCs as an Educational Approach for Professional Development .....	9
1.4 Flexible learning pathways: The Cafeteria model.....	10
1.5 Module Design Overview .....	12
1.6 Educational Design Research Framework .....	13
1.7 Design Principles Guiding MOOC Development.....	13
1.7.1 Flexibility .....	13
1.7.2 Practical Relevance .....	14
1.7.3 Real-World Application.....	14
1.7.4 Iterative Development and Evaluation .....	14
1.8 Canvas as a Learning Management System .....	14
<b>2. Identified competencies from the previous intellectual outputs .....</b>	<b>16</b>
2.1 Competencies identified in public procurement Professionals Community .....	16
2.2 Competencies identified in the environmental engineers' community .....	16
2.3 Competencies identified in SMEs community.....	17
2.4 Targeted competencies in the module-based course .....	17
<b>3. Learning goals and objectives in the designed modules .....</b>	<b>19</b>
3.1 Introduction and Sustainability Module .....	19
3.2 Specialised modules .....	21
3.2.1 Procurement module .....	21
3.2.2 Environmental Engineering module .....	23
3.2.3 SMEs module.....	25
3.3 An online forum for enhanced collaboration.....	27
<b>References .....</b>	<b>28</b>

## List of Tables

<b>Table 1</b> Identified key competencies from the previous IOs of the project PRECIUS .....	<b>18</b>
<b>Table 2</b> Learning objectives, skills and description for Introductory and Sustainability Module .....	<b>20</b>
<b>Table 3</b> Learning objectives, skills and description for Procurement Module .....	<b>21</b>
<b>Table 4</b> Learning objectives, skills and description for Environmental Engineers Module .....	<b>23</b>
<b>Table 5</b> Learning objectives, skills and description for SMEs Module .....	<b>25</b>

## List of Figures

Figure 1 Curricular spider web .....	9
Figure 2 Course structure overview .....	11
Figure 3 Module structure overview.....	12

## Abstract

In response to the increasing demand for sustainable procurement practices across public and private sectors, the PRECIUS Project has developed an online module-based course to equip professionals with the skills necessary to navigate the complex challenges of sustainable development. This course targets public procurement professionals, environmental engineers, and SME representatives, recognising their unique roles and collaborative potential in driving sustainability. By integrating sustainability into procurement processes, this course aims to enhance participants' ability to implement innovative and sustainable solutions within their organisations, aligning with both regulatory requirements and market demands for environmentally responsible practices.

Structured across core and specialised modules, the course introduces participants to essential sustainability concepts, technical expertise, and strategic thinking. The foundation module establishes a comprehensive understanding of sustainability, preparing participants to delve deeper into their specialised fields. Through modules focusing on creativity in procurement, technical innovation in environmental engineering, and sustainability-focused entrepreneurship, the course addresses key competencies for each sector, emphasising skills such as collaborative problem-solving, strategic planning, and adaptability.

The PRECIUS Project's course design is underpinned by Challenge-Based Learning (CBL), promoting real-world application through the Engage, Investigate, and Act framework. By utilising the Green Levers Tool and engaging in interactive exercises, participants develop actionable skills and learn to co-create sustainable solutions. Additionally, the use of an online forum on Canvas fosters peer-to-peer collaboration and ongoing engagement, enabling participants to share insights, tackle case studies, and build professional networks. This innovative course approach not only enhances individual competencies but also encourages cross-sector collaboration, empowering participants to contribute effectively to sustainable procurement and development initiatives. Through this course, the PRECIUS Project aims to bridge educational gaps in sustainability, fostering a skilled workforce capable of leading sustainable change across industries.

## Introduction

Effective and sustainable procurement practices are becoming increasingly vital across various sectors. Modern organisations, whether public or private, are under growing pressure to integrate sustainability into their operations, not only to comply with regulatory demands but also to meet the expectations of a more environmentally conscious market. The intersection of public procurement, environmental engineering, and SME innovation is particularly crucial in driving this shift toward sustainability. As these sectors collaborate, the ability to procure, develop, and implement innovative and sustainable solutions becomes a key determinant of an organization's success and societal impact.

In the context of public procurement, sustainability is no longer a peripheral concern but a central element of strategic planning. Public procurement professionals are now tasked with identifying and acquiring solutions that not only meet functional needs but also align with broader environmental goals. This requires a deep understanding of sustainable technologies, effective supplier engagement, and the ability to navigate complex regulatory frameworks.

For environmental engineers, the challenge lies in developing solutions that are not only innovative but also scalable and compatible with the needs of public sector clients. This demands a robust set of competencies in both technical innovation and cross-sector collaboration, enabling them to translate their expertise into practical, sustainable solutions that can be adopted by public entities and SMEs alike.

SMEs play a critical role in this ecosystem as well, acting as the bridge between innovation and implementation. However, for SMEs to successfully compete in the public procurement space, they must possess a comprehensive understanding of the procurement process and be able to articulate the sustainability benefits of their offerings. The ability to co-create with public procurement professionals and environmental engineers is therefore essential for SMEs to thrive in this increasingly competitive and sustainability-driven market.

The importance of equipping professionals in these sectors with the necessary skills and knowledge cannot be overstated. As organizations seek to meet the demands of sustainability and innovation, the need for well-trained professionals who can navigate these challenges is growing. Despite this, there remains a significant gap in education and training for procurement, environmental engineering, and SME professionals, particularly in the areas of sustainable procurement and cross-sector collaboration. Recent studies highlight a shortage of competencies in these areas, with many professionals lacking the skills needed to effectively contribute to sustainable procurement processes. This is compounded by the increasing complexity of global supply chains and the heightened expectations for sustainability in both the public and private sectors. Consequently, the demand for professionals equipped with these critical skills is rising, creating significant opportunities for those who possess them. In response to these challenges, the PRECIUS project aims to bridge this gap by developing a comprehensive educational module-based course that equips public procurement professionals, environmental engineers, and SME representatives with the competencies necessary to excel in sustainable procurement and innovation. The presented design of the course is designed to meet the current and future needs of these sectors, ensuring that they are prepared to lead the way in sustainable development.

## 1. Intellectual Output 4: Design of an online course

### 1.1 Rationale

The rationale for this online course is structured into several sub-sections, each drawing upon various Intellectual Outputs (IOs) from the PRECIUS Project, along with insights gained from practical engagement with key stakeholders across different sectors. The course is designed to equip participants with the necessary competences and skills to address the challenges of sustainable procurement, environmental engineering, and SME innovation in the context of public procurement.

The foundation of this course was established in IO1, where an extensive literature review was conducted to identify the critical competences required for sustainable and innovative procurement practices. This output synthesized academic research with practical insights to create a preliminary framework of the skills and knowledge essential for professionals in public procurement, environmental engineering, and SME sectors. Building on the findings from IO1, IO2 focused on qualitative research through World Café sessions and expert interviews across various countries, including Finland, Portugal, Lithuania, and the Netherlands. These sessions involved practitioners from public procurement, environmental engineering, and SMEs, who provided deeper insights into the specific competences needed to foster collaboration and innovation in sustainable procurement. The qualitative data collected was instrumental in refining the initial list of competences and understanding the practical applications of these skills in real-world scenarios. The refined list of competences from IO2 served as the basis for a comprehensive survey conducted in IO3. This survey aimed to quantify the importance and prevalence of these competences across a broader spectrum of professionals in the relevant fields. The results of IO3 provided a robust, data-driven understanding of the current skill gaps and the most critical competences that need to be addressed through targeted educational interventions. The insights gathered from IO1, IO2, and IO3 have directly informed the development of this online course, which represents IO4 of the PRECIUS Project. The course is structured into four modules, each designed to address specific competences identified as crucial for success in sustainable procurement and innovation. These modules will not only provide theoretical knowledge but also emphasize practical applications through case studies, interactive exercises, and collaboration with peers. The actual output, which includes the development of comprehensive learning and study materials for these online courses, is part of IO5 of the PRECIUS Project. This final output ensures that all insights and competences identified throughout the project are effectively translated into practical and accessible educational resources, supporting the continuous development of professionals in the field.

### 1.2 Challenge based learning integration into the course design

Challenge-Based Learning (CBL) is an educational framework that engages learners in addressing real-world problems through a structured process that includes identifying challenges, developing solutions, and implementing actions. CBL is built around three core stages: (Van den Akker, 2013)

- I. Engage: Learners start by identifying a "big idea" or broad theme that is relevant to both the curriculum and real-world issues. From this, they narrow down to a specific challenge that is meaningful and personally relevant to them. This stage is designed to spark curiosity and connect learning to real-life experiences.
- II. Investigate: In this stage, learners research the challenge from multiple perspectives. They gather information, explore different facets of the problem, and develop a deep understanding of the issues at hand. The investigation phase encourages critical thinking, information literacy, and the integration of knowledge across disciplines.
- III. Act: Finally, learners work collaboratively to design and implement solutions to the identified challenge. This could involve creating prototypes, launching initiatives, or developing campaigns. The act phase is highly hands-on and emphasizes the application of knowledge in practical, impactful ways. Throughout the process, learners reflect on their learning and outcomes, making adjustments as needed.

In each module, the principles of CBL will be applied to ensure participants are not only consuming information but also engaging with real-world challenges. For instance, procurement professionals may engage in simulated contract negotiations to implement sustainable practices, while environmental engineers could explore case studies on life cycle assessments. By guiding participants through the Engage, Investigate, and Act stages, the course ensures that theoretical knowledge is transformed into actionable skills that can be applied in professional contexts.

The concept of the Curricular Spider Web serves as a metaphor for the intricate and interdependent elements that constitute effective curriculum design. Just as a spider web is carefully constructed with various strands that are all interconnected, a curriculum is composed of multiple components that must work harmoniously to create a cohesive educational experience. These components include goals and objectives, content, learning activities, teacher roles, materials and resources, grouping, time, assessment, and learning environment. Each element is essential and interconnected, meaning that changes or weaknesses in one area can impact the entire curriculum structure. The Curricular Spider Web emphasizes the need for balance and coherence across all components to ensure that the educational goals are met effectively. This approach encourages educators to consider the curriculum as a holistic system where every aspect must be carefully planned and aligned to support targeted audience learning and development.



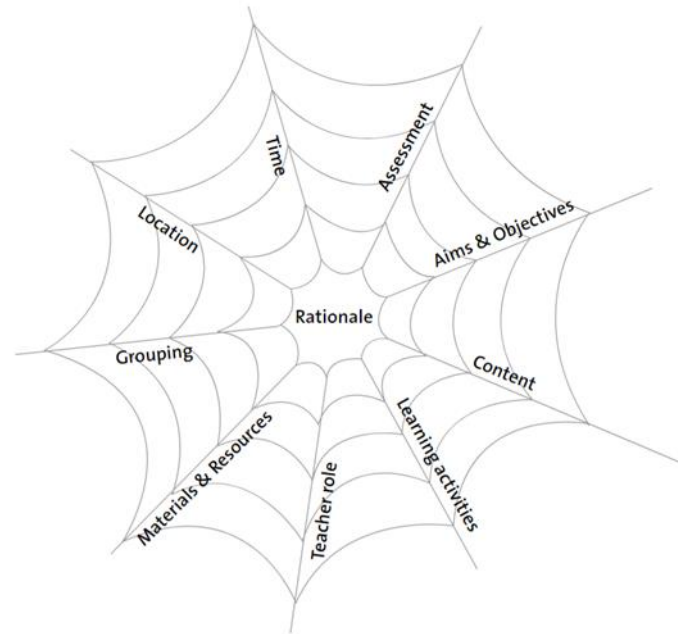


Figure 1 Curricular spider web. Based on Van den Akker (2013)

### 1.3 MOOCs as an Educational Approach for Professional Development

Massive Open Online Courses (MOOCs) have become a widely recognised method for delivering education at scale, offering flexibility, accessibility, and affordability (Bozkurt et al., 2017). They provide a valuable opportunity for professionals to continue their education and enhance their skills without the need to physically attend courses or interrupt their professional commitments. For professionals in the fields of public procurement, environmental engineering, and SMEs, MOOCs offer a solution that allows learning at a flexible pace while maintaining high-quality educational outcomes.

One of the key strengths of MOOCs is their ability to provide scalable learning environments where professionals can develop essential competencies at their own pace (Kennedy, 2013). This flexibility makes MOOCs ideal for busy professionals who must balance work responsibilities with their educational aspirations (Baturay, 2015). In particular, MOOCs offer accessibility by allowing learners from diverse geographical locations to engage in professional development without the need for travel or relocation. As noted in the (Baturay, 2015; Bozkurt et al., 2017), MOOCs create a flexible learning environment that can significantly increase engagement and support continuous learning.

The structure of MOOCs aligns well with the goals of professionals in procurement, environmental sectors, and SMEs. For these professionals, staying updated on industry trends, sustainability practices, and innovative procurement methods is crucial. MOOCs provide a structured yet flexible way to achieve this, offering modules that cover specific topics relevant to their work environments. By integrating practical examples and case studies, MOOCs ensure that professionals can directly apply what they learn to their roles, making the learning experience more meaningful and relevant to their day-to-day tasks.

Despite the many advantages, MOOCs also face challenges, particularly in terms of participant engagement and completion rates (Terras & Ramsay, 2015). Research highlights that many learners do not complete MOOCs due to passivity or a lack of motivation. To address these challenges, well-designed MOOCs for professional development need to focus on real-world applications, providing participants with clear learning goals and opportunities for interaction with peers. These strategies can help maintain motivation and ensure that professionals see the direct benefits of their participation.

The pedagogical framework of the course is centred around creating an engaging and practical learning experience (Terras & Ramsay, 2015). The course will feature micro-lectures, case studies, and peer collaboration, enabling participants to connect theoretical knowledge with practical tasks. Participants will be encouraged to engage in discussions, share insights from their professional experiences, and work together on case studies. By fostering a collaborative learning environment, the course enables participants to learn not only from the course materials but also from each other, enhancing the practical application of knowledge across different sectors. As with other MOOCs, learners will have the flexibility to complete the course at their own pace, but with regular check-ins and assessments to ensure knowledge retention and application.

#### 1.4 Flexible learning pathways: The Cafeteria model

To approach the diverse professional backgrounds of the target audience—public procurement professionals, environmental engineers, and SME representatives—the course adopts a cafeteria model. This flexible design allows participants to tailor their learning journey by selecting modules that align with their specific career needs. Just as in a cafeteria where individuals choose from a variety of options, participants in this MOOC can select from distinct modules focused on procurement, development, or entrepreneurial skills. The procurement module is designed for procurement professionals, emphasising sustainable purchasing practices and supply chain management. The development module is designed for environmental engineers, focusing on innovation, technical solutions, and sustainable project management. Finally, the entrepreneurial module addresses the needs of SMEs, focusing on business development, co-creation, and innovative market strategies. This modular structure provides flexibility, ensuring that participants acquire relevant, role-specific competencies while still sharing a core foundation in sustainability principles across all sectors. The cafeteria model ensures that the learning experience is both personalized and practical, directly applicable to participants' professional roles and industry challenges.

The course is structured into a modular format that allows participants to choose their preferred learning experience based on their professional background and specific learning needs. The overall design consists of a set of core and specialized modules, allowing participants to complete 4 ECTS courses. The core module provides a foundation in sustainability, while the specialised modules allow participants to receive training in areas most relevant to their profession: Procurement, Development, or Entrepreneurship.

## 1. Core Module: Introduction and Sustainability (1 ECTS)

All participants begin with a comprehensive introduction to sustainability principles, providing a universal foundation applicable across all professional roles. This module covers essential topics such as sustainable practices, ecological and social challenges in procurement, and the role of innovation in driving sustainability across sectors. Upon completion, participants will have the necessary background to understand sustainability's impact on procurement and development processes.

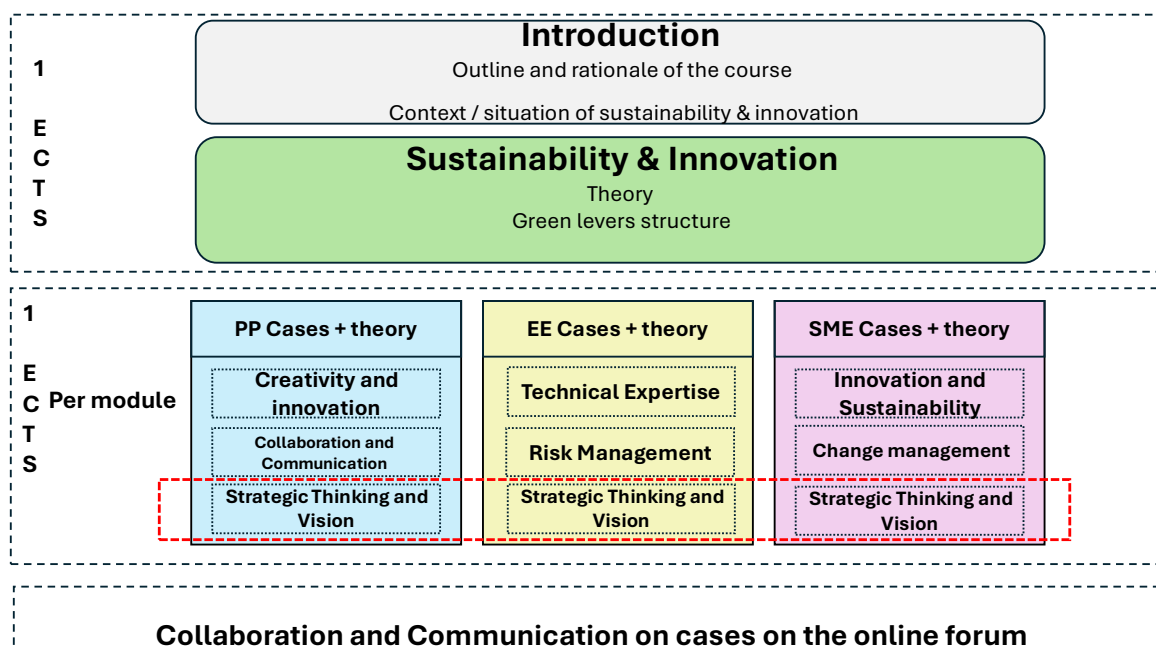


Figure 2 Course structure overview

## 2. Specialized Modules (1 ECTS each)

After completing the core sustainability module, participants are offered to select one of three specialised pathways based on their professional focus. However, they are not strictly limited only to one, they can also follow modules outside of their professional area. Modules offered in the “cafeteria” part of the course are:

- **Procurement Module (1 ECTS):** Designed for procurement professionals, this module focuses on Creativity and Innovation in Sustainable Public Procurement, Collaboration and Communication and Strategic Thinking and Vision. It prepares participants to make informed, sustainability-oriented decisions in procurement processes.
- **Development Module (1 ECTS):** Targeted at environmental engineers, this module addresses the development of innovative sustainable solutions. Participants explore Technical expertise in relation to sustainability solutions, Risk Management related to sustainability and Strategic Thinking and Vision to incorporate sustainable solutions effectively.

- Entrepreneurial Module (1 ECTS): Geared towards SMEs, this module emphasises entrepreneurship, co-creation, and bringing sustainable innovations to market. It helps participants understand the intersection of innovation, sustainability, business growth and the need to adapt in transforming the market towards sustainability vision.

### 3. Online Forum – Interaction through collaboration and communication

#### 1.5 Module Design Overview

The structure of the presented modules follows the path where every module starts with the description of the intended learning outcomes (ILOs) and explains the rationale behind the module. Afterwards, the introduction to the module and case study is presented backed by additional reading materials or other study materials as shown in the Figure 3. The backbone of the module is a recorded lecture, which supplies learners with the needed theory to better understand case studies. The recorded lecture is followed by an activity to deepen and anchor the knowledge gained from the lecture. Activities vary from module to module, usually in the form of a quiz or interactive game. Micro-lectures serve as an extension of the explained theory to focus on particular nuances of the studied problem. Micro-lectures should provide learners with a closer understanding and support the ILOs in resolving the case study. Throughout, the whole course the participants are encouraged to share their ideas and solutions in the forum to communicate and enhance the collaboration with other participants from their own as well as from the distinct communities.

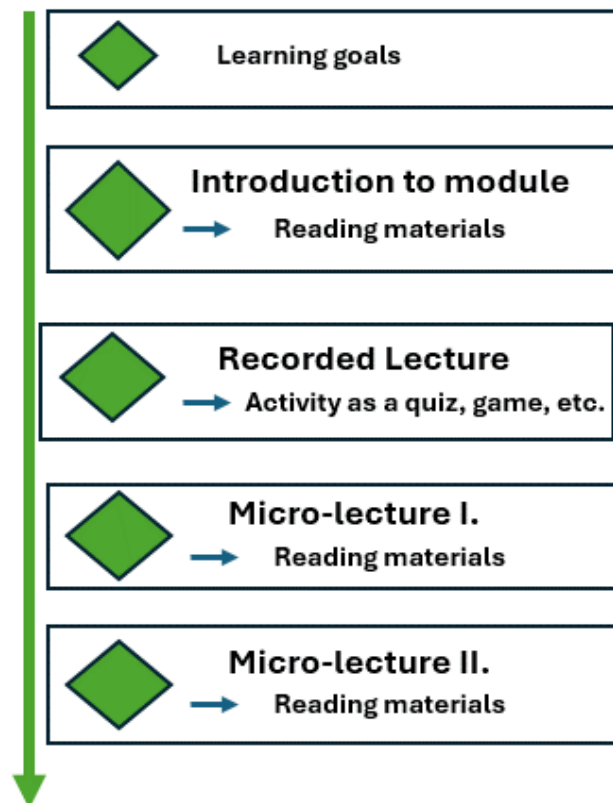


Figure 3 Module structure overview

## 1.6 Educational Design Research Framework

The development of this course is heavily informed by the principles of Educational Design Research (EDR), an approach that is especially suited for addressing complex educational challenges. EDR emphasizes a systematic, iterative process where the development, evaluation, and refinement of educational interventions are tightly interconnected. The goal is not only to create effective learning experiences but also to generate insights into the design process itself, contributing to both theoretical knowledge and practical application. At the core of the EDR approach is a cyclical model of development. This model begins with a thorough needs analysis, which helps identify the specific challenges faced by professionals in procurement, environmental engineering, and SMEs. Based on these insights, initial course designs are created and tested in real-world contexts. After each iteration, feedback is gathered, and the course is refined. This process repeats, ensuring that the learning interventions are responsive to participant needs and are continually optimized for effectiveness. A key component of the educational design research framework is the iterative feedback process. Throughout the course, participant feedback will be systematically gathered through surveys, discussions, and performance assessments. This data will be analysed to identify areas for improvement, ensuring that the course remains responsive to the evolving needs of professionals.

By adopting this research-driven model, the course goes beyond traditional static learning designs. Instead, it evolves over time, guided by both empirical data and theoretical foundations. This ensures that the course remains relevant, adaptable, and capable of meeting the diverse needs of its participants. Moreover, the flexibility offered by this design approach aligns with the professional demands of the target audience, allowing learners to engage with the content in ways that best suit their schedules and learning preferences.

The proposed educational design research approach ensures not only high-quality content but also deep integration of real-world application and practical relevance, making it highly effective for professional development in the fields of sustainable procurement, innovation, and environmental engineering.

## 1.7 Design Principles Guiding MOOC Development

The design of this MOOC is driven by a set of foundational design principles that ensure its effectiveness in professional settings. These principles—flexibility, practical relevance, and real-world application—form the backbone of the course structure and delivery, enabling professionals to engage with the content in ways that are both accessible and directly applicable to their work environments.

### 1.7.1 Flexibility

Flexibility is a core principle guiding the development of this MOOC. Recognizing the time constraints faced by procurement professionals, environmental engineers, and SMEs, the course is structured to allow participants to learn at their own pace. This self-paced learning model ensures that busy professionals can balance their career responsibilities with

continuing education. Additionally, the cafeteria model provides participants with the freedom to choose modules that align with their professional needs, offering a personalised learning experience that respects individual career goals.

### 1.7.2 Practical Relevance

To ensure that the course content is meaningful and valuable to the target audience, each module is designed with a strong emphasis on practical relevance. The course integrates case studies, real-world examples, and problem-solving exercises that mirror the challenges professionals face in their day-to-day roles. Whether in procurement, engineering, or SME entrepreneurship, the content is crafted to provide participants with actionable insights that can be immediately applied in their respective fields. Practical orientation makes the MOOC an important tool for the development of the competencies required for sustainable procurement and innovative development.

### 1.7.3 Real-World Application

The MOOC goes beyond theoretical knowledge by embedding real-world applications at the core of its learning objectives. Each module is designed to provide learners with opportunities to apply what they have learned in simulated or actual professional scenarios. For example, procurement professionals might engage in exercises on sustainable supply chain management, while environmental engineers could work on case studies focused on green innovations. The proposed approach ensures that learners are not only absorbing knowledge but also honing their ability to implement sustainable practices in real-world contexts.

### 1.7.4 Iterative Development and Evaluation

The development of this MOOC follows an iterative design process, in which the course content is continuously evaluated and refined based on participant feedback. This ensures that the learning experience remains aligned with the evolving needs of professionals in procurement, environmental engineering, and SME sectors. Regular feedback cycles allow for adjustments to be made in response to user experiences, ensuring the course's ongoing relevance and effectiveness.

The project team plans to test the educational tools developed in this project at a multiplier event scheduled for May 2025 at the University of Twente. Participants from three key stakeholder groups—public procurers, environmental engineers, and entrepreneurs—will engage in structured activities using the course's educational content and real case study examples. This event aims to simulate complex collaboration challenges, fostering cross-community engagement and gathering valuable feedback to further refine the MOOC design.

## 1.8 Canvas as a Learning Management System

For a platform and learning system hosting developed MOOC the online solution of Canvas was chosen. Canvas is a widely adopted Learning Management System (LMS) developed by Instructure, designed to facilitate online education for institutions, educators, and learners. Canvas offers a comprehensive suite of tools and features that support the creation, delivery, and management of online courses, making it a suitable platform for MOOCs.

## Key Functionalities of Canvas

- **Course Creation and Management:** Canvas provides intuitive tools for developing course content, including modules, assignments, quizzes, and discussions. Educators can structure courses to align with learning objectives and outcomes.
- **Communication and Collaboration:** The platform supports various communication channels such as announcements, messaging, and discussion forums, fostering interaction between instructors and students. Collaborative tools like group projects and peer reviews enhance learner engagement.
- **Assessment and Grading:** Canvas offers robust assessment features, including customisable quizzes, assignments, and rubrics. The SpeedGrader tool streamlines the grading process, allowing for timely and efficient feedback.
- **Analytics and Reporting:** Educators have access to detailed analytics that track student progress, participation, and performance, enabling data-driven decisions to improve learning outcomes.
- **Integration Capabilities:** Canvas supports integration with numerous third-party applications and tools, such as Google Workspace, Microsoft Teams, and various educational apps, enhancing the learning experience.
- **Mobile Accessibility:** With dedicated mobile apps for students and instructors, Canvas ensures that learning and teaching can occur anytime and anywhere, accommodating diverse learning environments.

## Limitations of Canvas

- **Customisation Constraints:** While Canvas offers a range of features, some users find its customization options limited compared to other LMS platforms, potentially restricting the ability to tailor the user experience extensively.
- **Learning Curve:** New users, particularly those without prior LMS experience, may encounter a steep learning curve when navigating Canvas's interface and features.
- **Technical Issues:** Instances of technical challenges, such as slow loading times and occasional functionality issues, have been reported, especially during peak usage periods.

## Suitability for MOOCs

Canvas's robust feature set makes it an excellent choice for hosting MOOCs, among other things most standing out are:

- **Scalability:** Canvas is designed to handle large numbers of users simultaneously, accommodating the expansive reach of MOOCs.
- **Engagement Tools:** Interactive features like discussions, quizzes, and multimedia content support active learning, which is crucial for maintaining engagement in MOOCs.
- **Analytics:** The platform's analytics tools allow educators to monitor learner progress and participation, providing insights to enhance course effectiveness.
- **Integration and Accessibility:** The ability to integrate with various tools and the availability of mobile apps ensure that learners have flexible access to course materials, catering to a global audience.



Canvas offers a comprehensive and scalable solution for delivering MOOCs, equipped with essential tools to create engaging and effective online learning experiences. While there are some limitations, its strengths in course management, communication, and integration make it a strong candidate for educators aiming to reach a broad audience through online courses.

## 2. Identified competencies from the previous intellectual outputs

This chapter presents the outcomes of the previous Intellectual Outputs (IOs) from the PRECIUS project, focusing on the key competences required by three distinct communities—public procurement professionals, environmental engineers, and SMEs—to effectively contribute to sustainability and innovation in their respective roles. The objective is to identify and articulate the specific skills that each community must develop to navigate the challenges of modern procurement and environmental practices. These identified competences will be directly addressed in the course we are designing, ensuring that participants are equipped with the necessary tools and knowledge to meet the demands of an increasingly sustainability-focused market. Additionally, the chapter explores the shared competences across these communities, emphasizing the collaborative potential in advancing sustainable solutions.

### 2.1 Competencies identified in public procurement Professionals Community

The public procurement community plays a pivotal role in driving sustainability through its strategic purchasing decisions. The PRECIUS project identified several key competences essential for public procurement professionals to effectively integrate sustainable practices into their procurement processes. The findings highlight the importance of competences such as risk-taking, creativity, and the ability to anticipate changes in the operating environment, which are crucial for identifying and procuring innovative sustainable solutions. Public procurement professionals also need a deep understanding of different procurement procedures, as well as the ability to cooperate with suppliers during the contract period to foster continuous improvement and sustainability. Additionally, strong communication skills are vital for articulating the objectives of sustainable procurement to suppliers and ensuring alignment with broader environmental goals. The findings also emphasise the need for public procurement professionals to develop change management skills to successfully implement new sustainability-oriented practices. Overall, the public procurement community is positioned as a critical enabler of sustainability, requiring a robust set of competencies to navigate the complexities of modern procurement while driving environmental innovation.

### 2.2 Competencies identified in the environmental engineers' community

The community of environmental engineers is at the forefront of developing and implementing innovative solutions that drive sustainability across various sectors. The PRECIUS project identifies several crucial competencies that environmental engineers must possess to effectively contribute to sustainable procurement and collaboration with public and private stakeholders. Among the key findings, creativity and open-mindedness are highlighted as essential for inventing novel sustainable solutions, enabling engineers to think outside the box and design environmentally friendly products and processes. Additionally, the



ability to conduct thorough life cycle assessments (LCA) is critical for evaluating the environmental impact of products and processes, ensuring that sustainability is embedded at every stage of development. Environmental engineers must also excel in collaboration and communication, as co-creating solutions with public procurement professionals and SMEs requires interdisciplinary teamwork and the sharing of knowledge across different fields. Strategic vision and critical thinking are further emphasised as necessary competencies, enabling engineers to anticipate future challenges and opportunities, particularly in the context of advancing sustainable technologies. The findings underscore the role of environmental engineers as key contributors to sustainability, requiring a comprehensive skill set that includes both technical expertise and the ability to collaborate effectively across sectors.

The modular structure of the course allows professionals to select specific areas of interest or need, ensuring a personalized learning journey. Each module focuses on a distinct competency in sustainable procurement, environmental engineering, or SME innovation, allowing participants to tailor their learning according to their career goals. Modular design ensures that learners can quickly integrate the skills and knowledge they acquire into their professional practices, thereby making the educational experience highly relevant and practical for their specific roles.

### 2.3 Competencies identified in SMEs community

The community of SMEs (Small and Medium Enterprises) plays a crucial role in bridging the gap between innovation and practical implementation in the realm of sustainable procurement. The PRECIUS project highlights several essential competencies that SME professionals need to effectively engage in public procurement and co-create sustainable solutions. Among the key findings, subject matter expertise in sustainability and market knowledge are identified as critical for SMEs to successfully navigate the procurement landscape and position their solutions as viable and desirable for public sector clients. Networking and communication skills are also emphasized as vital, enabling SMEs to build and maintain relationships with key stakeholders, including public procurement officers and environmental engineers. Additionally, financial acumen is crucial for understanding the cost-benefit dynamics of sustainable projects and effectively presenting these to public clients. SMEs must also be proficient in proposal and grant writing, as these skills are necessary to secure contracts and funding in a competitive procurement environment. Moreover, the ability to innovate and adapt quickly is highlighted as a significant advantage, allowing SMEs to respond to the evolving demands of sustainability and maintain a competitive edge. Overall, the findings underscore the importance of a well-rounded skill set for SMEs, encompassing both technical knowledge and strategic capabilities, to thrive in the increasingly sustainability-focused market.

### 2.4 Targeted competencies in the module-based course

Across the three communities—public procurement professionals, environmental engineers, and SMEs—several shared skills and competencies are essential for advancing sustainability and innovation in procurement and development processes. A key shared competence is creativity and innovation, which is vital for all three groups to develop, identify, and

implement novel sustainable solutions. Collaboration and communication are also crucial across the board, enabling effective teamwork among public procurement professionals, environmental engineers, and SMEs, ensuring that sustainable solutions are co-created and successfully implemented. Strategic thinking and vision are required to anticipate future challenges and opportunities in sustainability, allowing these professionals to align their efforts with long-term environmental goals.

**Table 1** Identified key competencies from the previous IOs of the project PRECIUS

Competence	Public Procurement Professionals	Environmental Engineers	SMEs
<b>Creativity and Innovation</b>	Developing innovative procurement strategies	Inventing novel sustainable solutions	Innovating sustainable products and services
<b>Collaboration and Communication</b>	Engaging with suppliers and stakeholders	Working with diverse teams and sharing knowledge	Building relationships with public procurement and engineers
<b>Strategic Thinking and Vision</b>	Planning for value creation in sustainability goals	Anticipating future challenges in sustainable technologies	Aligning business strategies with sustainability objectives
<b>Adaptability and Flexibility</b>	Responding to changing procurement landscapes	Adjusting designs and processes to meet evolving needs	Adapting to market demands and procurement requirements
<b>Risk Management</b>	Assessing and managing risks in procurement decisions	Evaluating environmental risks and technological adoption	Managing financial and market risks in sustainable ventures
<b>Technical Expertise</b>	Understanding procurement procedures and legal frameworks	Conducting life cycle assessments and technical evaluations	Navigating sustainability metrics and market knowledge

Additionally, all three communities benefit from adaptability and flexibility, which allow them to navigate the complexities of modern procurement and environmental challenges while remaining responsive to changing demands and conditions. Risk management is another shared competence, particularly in making decisions that involve new technologies or processes that support sustainability, where the ability to evaluate and take calculated risks is essential. Lastly, technical expertise, whether in procurement procedures, environmental impact assessments, or sustainable technologies, is fundamental to ensuring that all actions and decisions are grounded in robust knowledge and understanding, leading to effective and sustainable outcomes.

Each of the modules in the course is designed to target specific competencies identified across the public procurement, environmental engineering, and SME communities. For instance, the Procurement Modules are focused to equip participants with strategic, innovative, and collaborative competencies essential for driving sustainable and innovative public procurement. The Development Module addresses key competencies such as innovation in sustainable technologies and interdisciplinary collaboration. Entrepreneurial Module enhances SME competencies in co-creation, proposal writing, and sustainability-focused business strategies. By aligning each module with the identified competencies, the course ensures that participants are equipped to meet the demands of their specific professional contexts and develop identified competences as intended learning outcomes.

### 3. Learning goals and objectives in the designed modules

The following section provides a comprehensive overview of modules contained in the MOOC developed by a project's consortium partners. The overview briefly explains the learning objectives for each module as well as the skills (as ILO) covered within the module.

#### 3.1 Introduction and Sustainability Module

The introductory module sets the stage for the entire course by grounding all participants in the essential concepts of sustainability and demonstrating how these concepts are practically applied through the Green Levers Tool. Recognising that sustainability is a multifaceted challenge requiring cross-sector collaboration, the module brings together public procurement professionals, environmental engineers, and entrepreneurs to enhance mutual understanding and shared commitment.

Participants will engage with lectures and interactive content that introduce sustainability principles and the regulatory environment driving the need for sustainable practices. The Green Levers Tool serves as the core framework for the module, offering a structured approach to identifying opportunities where environmental and economic objectives align.

Through collaborative activities, such as group workshops and role-playing exercises, participants will apply the Green Levers Tool to real-world scenarios, enhancing their ability to think strategically and work effectively with professionals from other disciplines. These experiences are designed to break down silos between sectors and encourage the kind of integrated thinking necessary for advancing sustainability goals. By integrating the Green Levers Tool into the Introduction to Sustainability module, participants gain a practical and strategic approach to embedding sustainability into their professional practices.

By the end of the module, participants will not only understand the theoretical underpinnings of sustainability but will also have practical experience in applying tools and strategies that can be immediately relevant to their professional roles. This foundation prepares them for the specialised modules that follow, where they will follow more closely into how sustainability intersects with their specific fields.

**Table 2** Learning objectives, skills and description for Introductory and Sustainability Module

Introduction and Sustainability Module 1 ETCS
<p><i>Application of the Green Levers Tool</i></p> <p>At the end of this module, participants will be able to apply the Green Levers Tool to identify opportunities that align cost savings with sustainability benefits within supply chains. They will utilise structured lever analysis to balance environmental requirements with cost-effectiveness, enabling innovative and sustainable sourcing strategies.</p> <p><b>Learning objectives:</b></p> <ul style="list-style-type: none"> <li>• Explain the purpose and structure of the Green Levers Tool.</li> <li>• Describe the seven lever categories and their applications in sustainability and cost-saving.</li> <li>• Apply the Green Levers Tool to real-world case studies to identify sustainable solutions.</li> <li>• Identify innovative strategies that integrate sustainability objectives with economic benefits.</li> </ul> <p><b>Skills covered:</b></p> <ul style="list-style-type: none"> <li>→ Analytical thinking</li> <li>→ Problem-solving</li> <li>→ Creativity</li> <li>→ Application of sustainability tools (technical expertise)</li> </ul> <p><b>Description:</b></p> <p>This introductory module serves as the foundation for the entire course, bringing together participants from public procurement, environmental engineering, and entrepreneurship. It focuses on building a shared understanding of sustainability concepts and the importance of integrating these principles into professional practice.</p> <p>Participants will learn about the fundamental principles of sustainability, including environmental, social, and economic dimensions. The module will cover key regulations impacting sustainability, such as the EU's Corporate Sustainability Due Diligence Directive, emphasising the increasing importance of sustainability in regulatory frameworks.</p> <p>A central component of the module is the Green Levers Tool, which provides a structured approach to identifying opportunities where sustainability objectives align with cost savings in supply chains.</p> <p>Person responsible from PRECIUS: <i>prof. dr. Holger Schiele, Dr. Klaas Stek, Dr. Jakub Sieber</i>  <i>University of Twente</i></p>

## 3.2 Specialised modules

### 3.2.1 Procurement module

**Table 3** Learning objectives, skills and description for Procurement Module

Modules for Procurement (1ECTS)		
Creativity and Innovation	Strategic Thinking and Vision	Collaboration and communication
<p>At the end of this module, participants will be able to develop creative and innovative procurement strategies that align with sustainability goals, while effectively collaborating with engineers and entrepreneurs to ensure sustainable sourcing. They will also enhance their skills in analysing case studies, applying creative problem-solving, and communicating sustainability objectives with key stakeholders.</p> <p><b><u>Learning objectives:</u></b></p> <ul style="list-style-type: none"> <li>• Understand the role of procurement in fostering sustainability and innovation.</li> <li>• Apply innovative procurement practices that contribute to sustainable supply chains.</li> <li>• Develop creative procurement strategies that drive long-term sustainability goals.</li> <li>• Collaborate effectively with engineers and entrepreneurs to ensure sustainable</li> </ul>	<p>This module will equip participants with the skills to apply strategic perspectives to value creation, performance measurement, and innovative approaches in public procurement, enabling them to drive sustainable outcomes.</p> <p><b><u>Learning objectives:</u></b></p> <ul style="list-style-type: none"> <li>• Define and articulate a clear vision for performance-based procurement.</li> <li>• Apply strategic thinking in value creation to identify, evaluate, and prioritize procurement opportunities that drive value.</li> <li>• Analyse and measure the performance of strategic procurement decisions on sustainability outcomes.</li> </ul> <p><b><u>Skills covered:</u></b></p> <ul style="list-style-type: none"> <li>→ Strategic Thinking</li> <li>→ Vision Development</li> <li>→ Value creation</li> <li>→ Performance Analysis</li> </ul>	<p>At the end of this module, participants will develop essential competencies in collaboration and communication needed to drive innovative and sustainable outcomes in public procurement. They will enhance their skills by analysing case studies from sustainable public procurement, applying interaction theories to grasp the unique dynamics of public-private relationships, and fostering effective stakeholder engagement.</p> <p><b><u>Learning objectives:</u></b></p> <ul style="list-style-type: none"> <li>• Apply interaction theories to improve collaboration in buyer-supplier relationships.</li> <li>• Develop skills in communication and collaboration tailored to public procurement's regulatory and interactional nuances.</li> <li>• Recognize and utilise specific competencies—Interaction competences and capacities, Communication Abilities—for effective stakeholder engagement.</li> </ul>

<p>sourcing and foster innovation across sectors.</p> <p><b><u>Skills covered:</u></b></p> <ul style="list-style-type: none"> <li>→ Creative problem solving</li> <li>→ Collaborative leadership</li> <li>→ Innovative strategy development</li> <li>→ Case study analysis</li> </ul>		<p><b><u>Skills Covered:</u></b></p> <ul style="list-style-type: none"> <li>→ Understanding Frameworks for Analysing Public Procurement Interactions and Relationships</li> <li>→ Applying Competency Frameworks for Effective Collaboration and Relationship Management</li> <li>→ Case Study Analysis</li> </ul>
<p><b><u>Description:</u></b></p> <p>This module emphasises creativity and innovation in sustainable procurement, which is reinforced by the case study that participants will discuss in the forum. The competencies of creativity and collaboration are foundational for procurement professionals to drive sustainable practices while working with engineers and entrepreneurs. By focusing on these aspects, learners will be ready to engage in interdisciplinary discussions and joint problem-solving in the final module, where the case study will serve as a practical example of cross-functional innovation.</p>	<p><b><u>Description:</u></b></p> <p>This module focuses on the strategic application of procurement to create value and improve performance outcomes, specifically within the context of sustainable and innovative public procurement. It explores how procurement processes can be optimized to align with organizational goals, drive innovation, and enhance sustainability while improving overall effectiveness. Participants will learn to develop and implement strategies that maximize the impact of procurement decisions on both organizational performance and long-term sustainability goals.</p>	<p><b><u>Description:</u></b></p> <p>This module emphasises the development of essential competences for collaboration and managing stakeholder relationships in public procurement environments. Effective collaboration in buyer-supplier relationships depends on specific skills that enable both parties to navigate complex interactions, align objectives, and co-create value. Through a case-based approach, participants will engage with real-world examples of innovative and sustainable public procurement practices, gaining a foundational understanding of collaboration and communication challenges unique to the public procurement landscape.</p>
<p><i>Person responsible from PRECIUS</i>  <i>Dr. Klaas Stek and Dr. Jakub Sieber,</i>  <i>University of Twente</i></p>	<p><i>Person responsible from PRECIUS</i>  <i>Dr. Aki Jääskeläinen and Matin Taheriruh,</i>  <i>Tampere University</i></p>	<p><i>person responsible from PRECIUS</i>  <i>Matin Taheriruh and Alireza Safarpour,</i>  <i>Tampere University</i></p>

### 3.2.2 Environmental Engineering module

**Table 4** Learning objectives, skills and description for Environmental Engineers Module

Module for Environmental Engineers (1 ECTS)		
Technical Expertise	Strategic Thinking and Vision	Risk Management
<p>At the end of this module, participants will be able to have a technical understanding that allows them to make informed decisions about sustainable products, materials, and processes. To support those decisions, the participants will be able to apply life cycle assessment methodology and to conduct technical evaluations that combined will enhance the accurate quantification of environmental impacts while developing precise technical solutions for their businesses.</p> <p><b><u>Learning objectives:</u></b></p> <ul style="list-style-type: none"> <li>• To apply technical knowledge to evaluate products based on their environmental performance (e.g., energy efficiency, recyclability) and communicate those specifications to procurement teams.</li> <li>• To select suppliers and products that align with sustainability criteria based on technical environmental standards.</li> <li>• To gain basic technical knowledge of tools and software (e.g., OpenLCA) to track</li> </ul>	<p>At the end of this module, participants will be able to anticipate future challenges in sustainable technologies. They will be able to evaluate contemporary solutions and rethink about better options for future. The candidate will be able to think long and short-term solutions for sustainable procurement.</p> <p>The participants will be able to evaluate case studies that enhances ability to develop vision by being critical in the cases.</p> <p><b><u>Learning objectives:</u></b></p> <ul style="list-style-type: none"> <li>• Understand the role of engineering in the strategic thinking and vision for Nobel solutions.</li> <li>• Apply strategic approaches in procurement that contribute to sustainable supply chains.</li> <li>• Strategically involved in the life cycle assessments and technical evaluations for sustainable sourcing in the supply chain.</li> </ul>	<p>At the end of this module, participants will be able to anticipate to avoid selecting products that pose environmental risks, such as those involving toxic chemicals, high water or energy usage, or excessive emissions. Participants will be able to compare the level and intensity of risk in the different selected product during procurement. They will be capable of balancing technical and financial trade-offs while safeguarding against unforeseen risks.</p> <p><b><u>Learning objectives:</u></b></p> <ul style="list-style-type: none"> <li>• Participants will be able to identify and anticipate environmental risks associated with products and processes.</li> <li>• Participants will be able to compare and assess the level and intensity of environmental risks across different products during procurement.</li> <li>• Participants can make informed procurement decisions by balancing technical requirements, financial considerations, and environmental risks.</li> </ul>

<p>sustainability metrics like carbon footprint and resource usage.</p> <ul style="list-style-type: none"> <li>To assertively incorporate technical solutions into procurement practices and to deliver innovative solutions that simultaneously can tackle future challenges.</li> </ul> <p><b><u>Skills covered:</u></b></p> <p>→ Sustainable products evaluation and selection;</p> <p>→ Being able to operate sustainable measures;</p> <p>→ Being able to use tools and technologies;</p> <p>→ Technical evaluation of products, materials and processes.</p>	<ul style="list-style-type: none"> <li>Participants will be able to collaborate with suppliers and buyers to develop a visionary action plan for sustainable procurement.</li> </ul> <p><b><u>Skills covered:</u></b></p> <p>Being strategic</p> <p>Being far-sighted</p> <p>Being solution oriented</p>	<ul style="list-style-type: none"> <li>Participants will be capable of safeguarding projects by anticipating and mitigating risks that could arise from product selection decisions.</li> </ul> <p><b><u>Skills covered:</u></b></p> <p>Being able to identify risk</p> <p>Being able to reason to judge problems and solutions</p>
<p><i>person responsible from PRECIUS</i>  <i>prof. dr. Žaneta Stasiškienė, Kaunas Technology Institute</i></p>	<p><i>The person responsible for PRECIUS</i>  <i>Prof. Myriam Lopes, University of Aveiro</i></p>	<p><i>The person responsible for PRECIUS</i>  <i>Prof. Myriam Lopes, University of Aveiro</i></p>



### 3.2.3 SMEs module

**Table 5** Learning objectives, skills and description for SMEs Module

Module for SMEs (1 ECTS)		
<i>Innovation and Sustainability</i>	<i>Strategic Thinking and Vision</i>	<i>Change management and Adaptability</i>
<p>At the end of this module, participants will be able to develop innovative sustainable products and services that meet market demands while contributing to environmental goals. They will enhance their ability to think creatively, apply innovative solutions, and collaborate with procurement professionals and engineers to drive sustainability in their businesses.</p> <p><b><u>Learning objectives:</u></b></p> <ul style="list-style-type: none"> <li>• Understand the role of innovation in creating sustainable business opportunities.</li> <li>• Apply creative thinking to develop products and services that address sustainability challenges.</li> <li>• Collaborate with stakeholders to integrate sustainability into product development.</li> <li>• Leverage sustainable innovation as a competitive advantage in the market.</li> </ul> <p><b><u>Skills covered:</u></b></p> <p>→ Creative problem-solving → Collaboration</p>	<p>At the end of this module, participants will be able to align their business strategies with long-term sustainability objectives. They will learn to anticipate future market trends, integrate sustainability into their vision, and develop strategic plans that position their businesses for success in a changing environment.</p> <p><b><u>Learning objectives:</u></b></p> <ul style="list-style-type: none"> <li>• Understand the importance of strategic thinking in sustainable entrepreneurship.</li> <li>• Develop a long-term vision that incorporates sustainability goals.</li> <li>• Analyse market trends to anticipate future opportunities and challenges.</li> <li>• Create strategic plans that align business objectives with sustainability.</li> </ul> <p><b><u>Skills covered:</u></b></p> <p>→ Strategic planning → Vision development → Sustainability integration</p>	<p>At the end of this module, participants will be able to effectively manage change within their organisations, adapting to evolving market demands and procurement requirements. They will develop skills to lead their teams through transitions, implement sustainable practices, and foster a culture of adaptability and continuous improvement.</p> <p><b><u>Learning objectives:</u></b></p> <ul style="list-style-type: none"> <li>• Understand the principles of change management in the context of sustainability.</li> <li>• Lead organisational change towards sustainable practices.</li> <li>• Cultivate adaptability within the business to respond to market and environmental shifts.</li> <li>• Implement strategies that support continuous improvement and innovation.</li> </ul> <p><b><u>Skills covered:</u></b></p> <p>→ Change Leadership</p>

→ Communication		→ Adaptability → Team Management
<b>Description:</b> This module emphasises the importance of creativity and innovation in entrepreneurship, focusing on developing sustainable products and services. Through case studies and interactive activities, participants will explore how innovative ideas can be transformed into viable business solutions that meet sustainability objectives.	<b>Description:</b> This module focuses on strategic thinking and vision, enabling entrepreneurs to position their businesses for long-term success by integrating sustainability into their core strategies. Participants will engage in activities that enhance their ability to think strategically about sustainability and its impact on business growth.	<b>Description:</b> This module introduces the concepts of change management and adaptability, critical for entrepreneurs navigating the dynamic landscape of sustainable business. Participants will learn how to lead change initiatives, overcome resistance, and build resilient organisations capable of thriving amid change.
<i>Person responsible from PRECIUS prof. dr. Holger Schiele, Dr. Desiree van Dun Dr. Dr. Rainer Harms, Dr. Jakub Sieber, University of Twente</i>	<i>Person responsible from PRECIUS prof. dr. Holger Schiele, Dr. Desiree van Dun Dr. Dr. Rainer Harms, Dr. Jakub Sieber, University of Twente</i>	<i>Person responsible from PRECIUS prof. dr. Holger Schiele, Dr. Desiree van Dun Dr. Dr. Rainer Harms, Dr. Jakub Sieber, University of Twente</i>

### 3.3 An online forum for enhanced collaboration

The online forum hosted on Canvas is an essential component of the course, designed to facilitate continuous interaction and collaboration among participants from all three communities—public procurement professionals, environmental engineers, and entrepreneurs. Available throughout the entire duration of the programme, the forum serves as a dynamic space where learners can exchange ideas, discuss applications of knowledge, and delve deeper into the topics covered in each module.

The forum encourages participants to share their insights, pose questions, and discuss the practical implications of the concepts they are learning. By engaging in these discussions, learners can explore different perspectives, gain a deeper understanding of the material, and consider how the knowledge can be applied within their own professional contexts. The diversity of the participants enhances the dialogue, as each community brings unique expertise and viewpoints to the table.

One of the primary functions of the forum is to facilitate the discussion of case studies presented throughout the course. Participants are invited to collaboratively analyse these cases, offering multidisciplinary approaches to problem-solving. This collective analysis not only reinforces the theoretical knowledge gained but also demonstrates the practical value of cross-sector collaboration in addressing complex sustainability challenges.

Moreover, the forum serves as a space for participants to reflect on the applications of the Green Levers Tool and other methodologies introduced in the course. By sharing experiences and discussing potential strategies, learners can support one another in understanding how to effectively integrate sustainability into their respective fields. This collaborative exploration helps to bridge the gap between theory and practice, empowering participants to become change agents within their organisations.

The online forum also plays a crucial role in enhancing communication skills. Engaging in thoughtful discussions requires participants to articulate their ideas clearly and considerately, fostering an environment of mutual respect and constructive feedback. This practice not only benefits individual learning but also contributes to the development of professional competencies that are essential in collaborative work settings.

By maintaining an active presence on the forum, participants can build professional networks that may extend beyond the scope of the course. These connections are invaluable for fostering ongoing collaboration and support among professionals committed to advancing sustainability and innovation within their industries.

Course facilitators monitor the forum to provide guidance, answer questions, and ensure that discussions remain productive and inclusive. While the forum is a space for peer-to-peer learning, the facilitators' involvement helps to steer conversations in meaningful directions and address any emerging queries related to the course content.

In the end, the online forum on Canvas is intended to be more than just a supplementary feature—it is a vital element that enriches the overall educational experience. By providing a continuous platform for idea exchange and collaboration, the forum supports participants in deepening their understanding of the material, applying knowledge in practical contexts, and building a cohesive community dedicated to sustainability. Engaging fully with the forum enhances not only individual learning outcomes but also contributes to the collective growth and success of all participants in the course.

## References

- Baturay, M. H. (2015). An overview of the world of MOOCs. *Procedia-Social and Behavioral Sciences*, 174, 427-433.
- Bozkurt, A., Akgün-Özbek, E., & Zawacki-Richter, O. (2017). Trends and patterns in massive open online courses: Review and content analysis of research on MOOCs (2008-2015). *International Review of Research in Open and Distributed Learning*, 18(5), 118-147.
- Kennedy, J. (2013). Characteristics of massive open online courses (MOOCs): A research review, 2009-2012. *Revista de Economia e Sociologia Rural*, 51.
- Terras, M. M., & Ramsay, J. (2015). Massive open online courses (MOOCs): Insights and challenges from a psychological perspective. *British Journal of Educational Technology*, 46(3), 472-487.
- Van den Akker, J. (2013). Curricular development research as specimen of educational design research. *Educational design research*, 53-70.