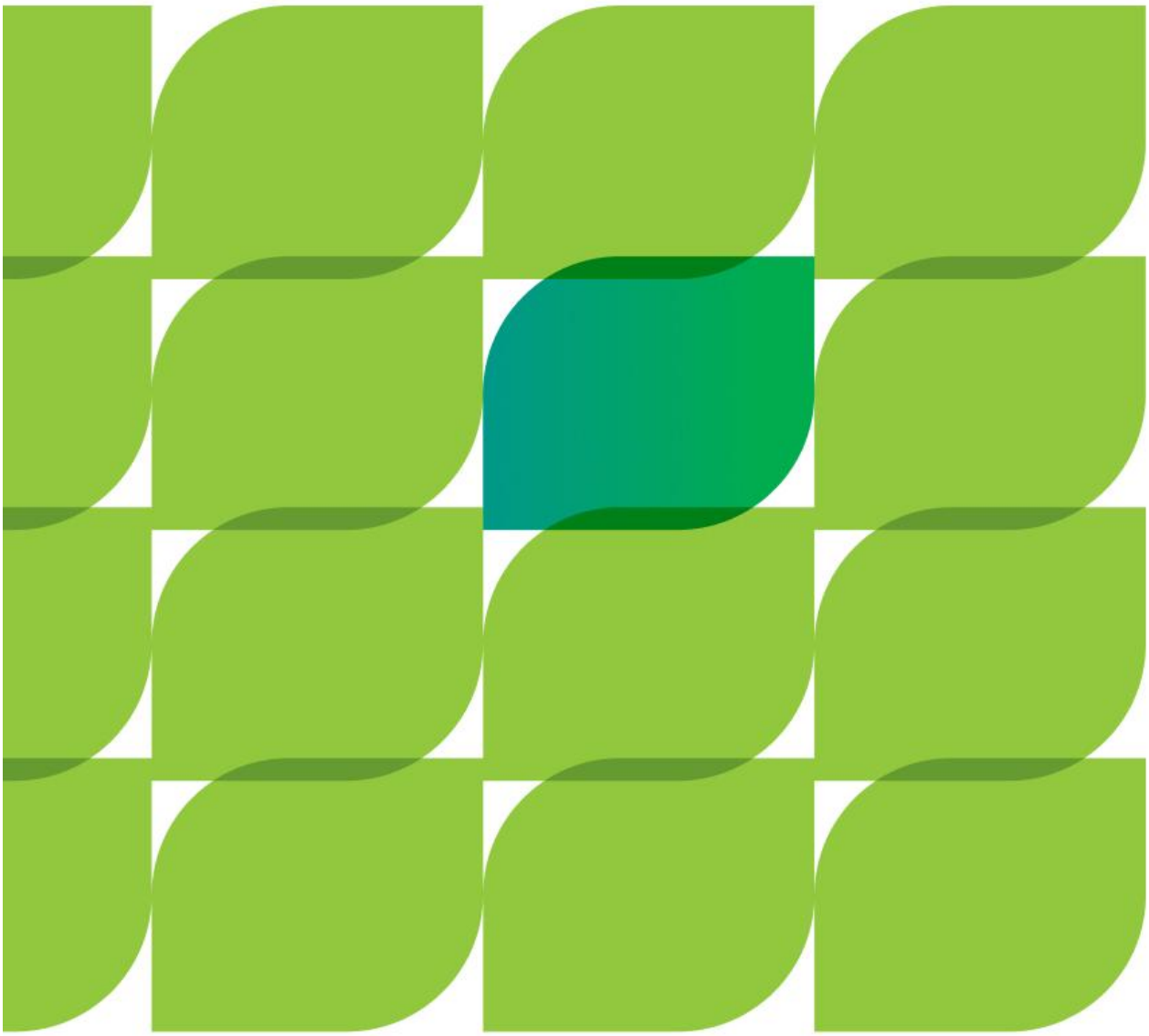
Digital 4 Sustainability
Skills for Europe's Twin Transition

D3.5: Train the Trainer (TTT) Programme



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About the Digital4Sustainability project

Digital4Sustainability is a pioneering initiative aimed at accelerating Europe's twin transition by equipping the workforce with the essential skills needed to drive sustainability-focused innovation. In response to the pressing need to achieve climate neutrality and meet the Sustainable Development Goals (SDGs), the project will develop a forward-thinking Digital Sustainability Skills Strategy as well as cutting-edge learning programmes. These efforts will address the urgent and emerging skills needs of the European industry, empowering the workforce to develop sustainable technologies that support Environmental, Social, and Governance (ESG) practices. By aligning closely with industry needs throughout the project, Digital4Sustainability will help European companies, particularly small and medium-sized enterprises (SMEs), achieve long-term competitiveness and growth through digital and sustainable transformation.

Funded by the Erasmus+ Programme of the European Union, this 4-year project unites 28 members of the Digital Large-Scale Partnership (Digital LSP) under the Pact for Skills, spanning 13 EU countries. The consortium includes digital and sustainability experts, business associations, universities, and Vocational Education and Training (VET) provider

The Digital4Sustainability Project Consortium

The Digital4Sustainability project consortium is an Erasmus+ Alliance for Sectoral Cooperation on Skills, bringing together 28 partners and Associated partners from 13 EU countries.

	Partners	Acronym	Country
1	Adecco Formazione Srl	Adecco Training	Italy
2	Adecco Italia Holding Spa	Adecco Holding	Italy
3	As Bcs Koolitus	BCS KOOLITUS	Estonia
4	Asociatia Cluj IT	CLUJ IT CLUSTER	Romania
5	Badgebox Srl	BadgeBox	Italy
6	CEFRIEL Società Consortile a Responsabilità Limitata	CEFRIEL	Italy
7	Cooperatie Eduserpro U.A.	Eduserpro	Netherlands
8	Digital Technology Skills Limited	DTSL	Ireland
9	DIGITALEUROPE AISBL	DIGITALEUROPE	Belgium
10	European DIGITAL SME Alliance	DIGITAL SME	Belgium
11	Fast Lane Institute For Knowledge Transfer GmbH	FAST LANE	Germany
12	Gospodarska Zbornica Slovenije	GZS CCIS	Slovenia
13	Gospodarska Zbornica Slovenije Center Za Poslovno Usposabljanje	GZS CPU	Slovenia
14	IVSZ - Digitalis Vallalkozasok Szovetsege	IVSZ	Hungary
15	Matrix Internet Applications Limited	MATRIX INTERNET	Ireland
16	National College Of Ireland	NCI	Ireland
17	Profil Klett D.O.O.	PK	Croatia
18	Sdruzenie Bulgarska Asociacia Na Softuernite Kompanii - Basscom	BASSCOM	Bulgaria
19	Stichting Hogeschool Utrecht	HU	Netherlands
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21	Universidad De Alcala	UNI ALCALA	Spain
22	Universidad Internacional De La Rioja SA	UNIR	Spain

23	Universität Koblenz	UNI KO	Germany
24	National University of Science and Technology Politehnica Bucharest	POLITEHNICA Bucharest	Romania

	Associated partners	**Acronym**	**Country**
1	Asociacija Infobalt	INFOBALT	Lithuania
2	SKILLNET IRELAND Company Limited By Guarantee	SKILLNET IRELAND	Ireland
3	The Council of European Professional Informatics Societies	CEPIS	Belgium
4	Universidad Complutense De Madrid	UCM	Spain

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What is Train the Trainer Programme?

The Train the Trainer (TTT) Programme is a structured support framework designed to help trainers understand, deliver and evaluate the Digital4Sustainability Learning Units and upskilling curricula developed within the Digital4Sustainability project. Upon completion of this programme, trainers will be equipped to interpret Learning Units, design outcome-driven activities, and document learner achievement according to project standards. A detailed list of these intended programme outcomes can be found in the final chapter, 'What Trainers Can Do After Completing the TTT Programme'

Rather than functioning as a traditional, linear training course, it provides a set of modular learning components, practical tools and clear guidance that trainers can use according to their needs and responsibilities. The TTT supports that all trainers, regardless of their institutional background or prior teaching, share a common understanding of the curriculum, its intended learning outcomes and the pedagogical approach behind it.

As Europe advances its twin transition, the need for professionals capable of facilitating high-quality training in digital sustainability is rapidly increasing. The TTT Programme provides a clear, structured and practical framework that empowers trainers **to understand the curricula, prepare for delivery, apply appropriate pedagogical approaches and integrate assessment and evidence collection.**

The programme is **self-paced** and **adaptable to different delivery contexts**. It functions as a set of reference materials, guidance and ready-to-use tools that trainers can access depending on their role, experience and delivery responsibilities.

Why is a TTT needed in Digital4Sustainability?

Digital4Sustainability introduces a new kind of learning that combines digital, data-driven and sustainability competencies in ways that are not commonly taught together. Trainers involved in the project come from diverse contexts, VET institutions, universities, industry and organisational learning environments and may be experts in one domain but not necessarily in curriculum delivery, competence-based teaching or assessment aligned with European frameworks.

The TTT Programme is therefore essential to:

- align how Learning Units are interpreted and delivered across training providers,
- ensure consistency and quality regardless of delivery context,
- provide trainers with a shared pedagogical and methodological foundation,
- support the pilot phase with trainers who understand how to generate and document evidence of learning.

The TTT Programme is designed to support consistent and high-quality delivery of the Digital4Sustainability curricula both during the project implementation and beyond its lifetime, enabling independent educators and training providers to use the materials after the project has ended.

Who is the TTT Programme for?

The Digital4Sustainability TTT Programme is a comprehensive resource designed for:

1. **Trainers participating in the Digital4Sustainability Pilot (Project Phase):** For these trainers, the Handbook serves as the primary guidance tool. While completion of the self-paced modules is flexible, adherence to the assessment templates and reporting procedures described in Module 5 is required to ensure consistent data for project validation.
2. **External Educators & Training Providers:** For professionals outside the consortium or using materials after the project ends, this Handbook serves as a best-practice framework for adopting and adapting the curricula to their local contexts.

While the programme is designed for flexible, self-paced use, it also includes guidance that supports coherent implementation and comparable learning outcomes across different settings.

How to use the TTT in self-paced format

The TTT Programme is designed for self-paced use, allowing trainers to engage with the content. The TTT supports trainers in their preparation process. There is no requirement to follow a fixed schedule or attend live sessions. Instead, trainers can select the modules most relevant to their delivery responsibilities and complete them in an order that fits their role and context; while ensuring they are familiar with the guidance on curriculum interpretation, delivery planning, and assessment and evidence collection.

A recommended pathway is:

1. Start with the introduction to understand the purpose and goals of this TTT.
2. Explore the modules that explain the curriculum structure, Learning Units and delivery approach.
3. Use templates and tools to prepare for your specific Learning Units.
4. Return to modules as needed, each works independently and can be revisited during planning or delivery.

The self-paced structure reduces training workload, respects different starting points among trainers and supports flexible adoption across institutions, sectors and countries.

Where to access materials

All TTT materials are available digitally on Digital4Sustainability project website, where trainers can access modules and templates in one place in a downloadable and printable format.

This ensures that:

- no trainer is dependent on a specific learning system,
- materials remain accessible across countries and institutions,
- trainers can use the resources even with limited technical infrastructure.

Module 1 - Understanding the Digital4Sustainability Curricula

The Digital4Sustainability curricula are developed in alignment with the European Green Deal and the Europe's Digital Decade 2030 goals. Specifically, the learning outcomes are mapped against the GreenComp and DigComp 2.2 frameworks to ensure EU-wide transparency and portability of skills. The Digital4Sustainability curricula form the foundation for all training activities within the project. They are designed as modular, competence-based learning pathways that support Europe's twin transitions by enabling learners to acquire skills that are directly applicable in professional contexts. To deliver them effectively, trainers must understand how the curricula are constructed and how each component connects to learning outcomes and delivery expectations.

1.1. Architecture of Curricula

The Digital4Sustainability curricula (Figure 1) is organised around two complementary components

1) **Core curricula and educational profiles (EQF 5–7)**

Broader curricular structures designed for VET and higher education programmes.
They define full competence pathways through a combination of **Programme Learning Outcomes (PLOs)** and selected **Learning Units (LUs)**.

2) **Upskilling Curricula**

Short, targeted learning programmes designed to address specific and urgent competence needs of professionals and organisations. They consist of selected learning units extracted from the core curricula and can be delivered in flexible formats, typically within a short time frame. Depending on institutional arrangements, successful completion may support the award of micro-credentials and recognition through ECTS.

Understanding how these two components relate is essential:

- **Educational profiles** provide **comprehensive learning pathways** for specific labour-market roles.
- **Upskilling curricula** extract **targeted subsets of LUs** to enable rapid capability development.

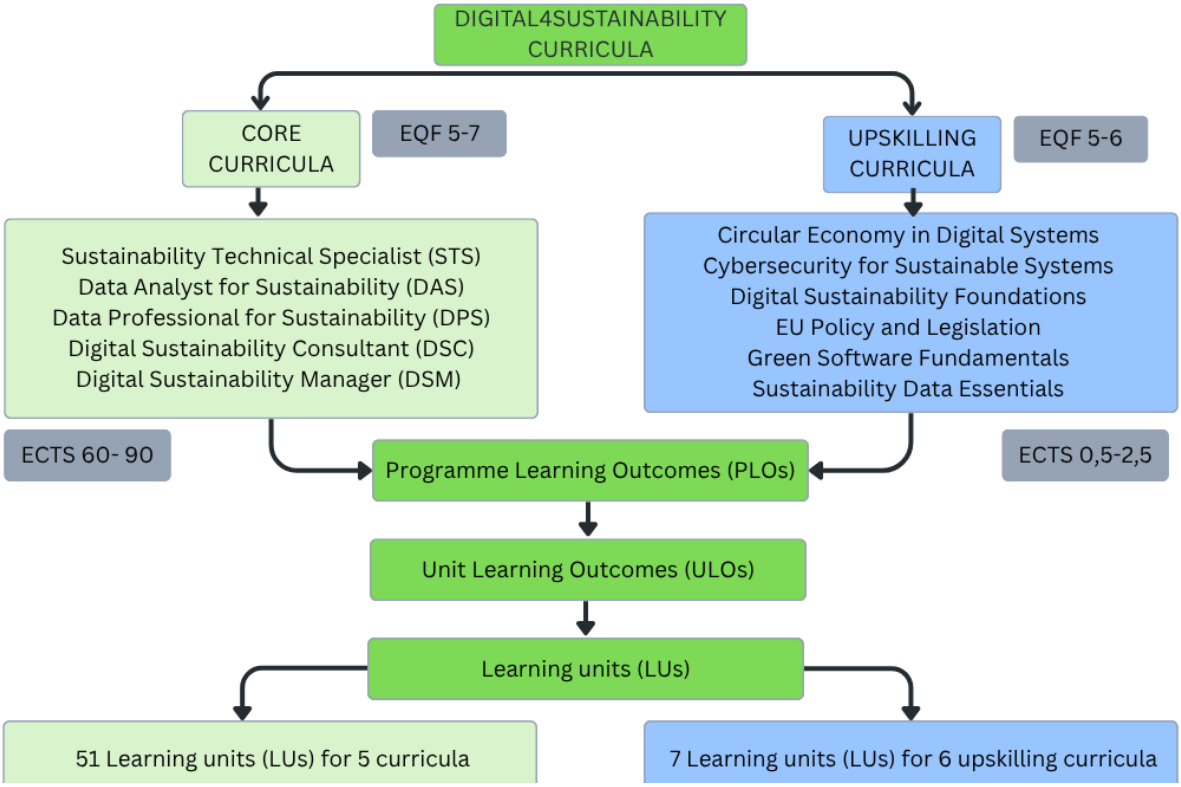

Figure 1 Architecture of Digital4Sustainability Curricula

Both components (Educational profiles and Upskilling Curricula) are built on **the same three structural elements**:

Table 1. Structural Elements and Trainer Focus of the Digital4Sustainability Curricula

Element	Description	Trainer Focus
Programme Learning Outcomes (PLOs)	Define what a learner must know, understand and be able to do at the end of a full programme	Understand competence scope and EQF level
Unit Learning Outcomes (ULOs)	Specify observable achievements for each Learning Unit	Translate ULOs into activities and assessment
Learning Units (LUs)	Modular components that deliver ULOs	Plan delivery based on LU content, not content lists

Key idea:

PLOs define where a learner must arrive, ULOs define what they must demonstrate, and LUs define the modular building blocks through which this is achieved (Biggs, 2003).

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1.2. Core curricula and educational profiles (EQF 5-7)

Five educational profiles have been developed to address distinct labour-market roles and competence demands:

Table 2. Core Educational Profiles and Target Learner Groups

	Profile	EQF Level	What it prepares learners for	Relevant for trainers
1	Sustainability Technical Specialist (STS)	5	Implementation, configuration and maintenance of sustainability digital systems; support & troubleshooting	VET trainers; technical LU trainers; workplace trainers
2	Data Analyst for Sustainability (DAS)	6	Foundational data analysis for sustainability; ESG dashboards; reporting & compliance	HE educators; VET teachers in data areas; sustainability/digital practitioners
3	Data Professional for Sustainability (DPS)	7	Advanced analytics; ML for sustainability; governance; modelling	HE educators; sustainability/digital practitioners; trainers for data-intensive LUs
4	Digital Sustainability Consultant (DSC)	7	Strategic advisory, ESG alignment, innovation and transformation	Consultants, practitioners, HE educators
5	Digital Sustainability Manager (DSM)	7	Managing digital sustainability strategies, transformation and organisational processes	Management/leadership trainers; HE educators; in-company trainers

Important for trainers:

These core curricula represent full professional pathways (60–90 ECTS). Trainers should focus on how their specific Learning Unit contributes to the overall professional profile and ensures the learner achieves the comprehensive competence level required for that role.

1.3. Upskilling Curricula

The project also includes **six upskilling curricula**, totalling 12 ECTS, designed for professionals who require targeted competence development. Each curriculum consists of a selection of LUs derived from the core curricula.

The Upskilling Curricula are shown in the table below:

Table 3. Overview of Upskilling Curricula and ECTS Allocation

Curriculum	ECTS	EQF	Source Units[1]
Circular Economy in Digital Systems	2.5	6	LU41
Cybersecurity for Sustainable Systems	2.5	6	LU46
Digital Sustainability Foundations	0.5	5	LU01
EU Policy and Legislation	1.5	6	LU50
Green Software Fundamentals	2.5	5	LU05, LU12
Sustainability Data Essentials	2.5	6	LU39

Important for trainers:

Upskilling curricula are short, targeted modules (0.5–2.5 ECTS) designed for rapid skill development. Trainers should prioritize immediate workplace applicability and flexibility in delivery, as these modules often serve professionals who need specific competences without completing a full degree/profile.

1.4. Competence Frameworks Used in the Curricula

The Digital4Sustainability curricula are aligned with three major European competence frameworks. These frameworks ensure coherence, transparency and alignment with EU qualification standards.

Table 4. European Competence Frameworks Integrated into the Curricula Design

Framework	Full Name	Purpose in the Curricula	Examples of Competence Areas
EQF	European Qualifications Framework	Defines required depth, cognitive complexity and responsibility at EQF levels 5, 6 and 7. Guides the expected sophistication of learning and assessment.	- Knowledge, skills & autonomy descriptors - Level alignment for LUs and PLOs

[1] Source Units and Lerning Units are defined and listed in document D3.1 mentioned earlier in the text

e-CF	European e-Competence Framework	Provides structure for digital, data and IT-related competences within the curriculum.	- Digital security - Application development - Component integration - Data analysis - IT service management - Business & change management
GreenComp	European Sustainability Competence Framework	Defines transversal sustainability competences integrated across profiles and LUs.	- Systems thinking - Futures literacy - Sustainability values - Action-oriented competences

Important for trainers:

These frameworks clarify:

- *how advanced the learner must be,*
- *what level of autonomy is expected,*
- *how assessment should reflect competence and not only content.*

Module 2 – Working with Learning Units

Learning Units (LUs) are the core building blocks of the Digital4Sustainability curricula. They define what learners must be able to *do* at the end of training, rather than prescribing what trainers should teach (Spady, 1994; Biggs, 2003). Each LU contains **Unit Learning Outcomes (ULOs)** which specify measurable behaviours aligned with EQF requirements and competence frameworks such as e-CF and GreenComp.

Understanding LUs correctly is essential because they determine delivery focus, teaching activities, and assessment requirements across all implementation contexts, during and beyond the project duration.

2.1. What Learning Units Are and How they Fit into the Curriculum

Learning Units:

- are derived from PLOs,
- contain specific ULOs,
- represent the smallest deliverable and assessable part of the curriculum,
- can be combined into full educational profiles or upskilling curricula.

This modular system allows trainers to deliver stand-alone LUs or group them into customised training pathways, while maintaining alignment with European qualification and competence frameworks.

Trainer takeaway: The LU is not a lesson, topic list or reading plan — it is a *modular competence based unit* that specifies what learners must demonstrate by the end of training.

> ***A Learning Unit such as "Configure a sustainability monitoring dashboard" defines the competence learners must demonstrate (e.g., setting up a KPI, exporting a report, explaining metric relevance). A lesson plan, by contrast, describes how the trainer will teach this competence (activities, timing, tools and examples).***

2.2. Understanding and Interpreting Unit Learning Outcomes (ULOs)

The mapping of verbs to EQF levels follows Bloom's Revised Taxonomy (Anderson & Krathwohl, 2001). **ULOs** define the observable results of learning. Each ULO:

- begins with a measurable action verb,
- specifies what the learner must be able to do,
- reflects the cognitive depth and autonomy expected at a particular EQF level,
- anchors the LU and determines assessment requirements.

Depth of learning and connection with EQF are described in following examples:

- verbs such as **identify** or **describe** signal lower autonomy and are typical at EQF 5
- verbs such as **analyse**, **interpret** or **compare** require analytical thinking at EQF 6
- verbs such as **evaluate**, **design**, or **justify** indicate strategic reasoning at EQF 7.

The verb dictates the **type of learner performance**. If the ULO requires learners to *analyse sustainability indicators*, trainers must create opportunities for analysis — not memorisation, summarisation or definition.

A ULO therefore tells the trainer three things:

1) the learner action (what must be done),
2) the context or object (what is being analysed, evaluated or configured),
3) the level of autonomy (guided practice vs. independent reasoning).

Rule: If learners cannot produce an observable outcome aligned with the ULO verb, the learning outcome has not been achieved

2.3. Determining What Evidence of Learning Is Required

ULOs implicitly define the **expected learner output**. Trainers must identify what tangible behaviour or product will demonstrate learning.

Examples of acceptable evidence:

- a short written justification of a chosen ESG metric,
- a simple dashboard configuration,
- a comparison of two sustainability strategies,
- identification of a cyber risk related to sustainability practice,
- analysis of sustainability indicators from a dataset.

Note for trainers: 'Analyse' verbs require written reports, while 'Configure' verbs require technical exports or screenshots

Common mistakes trainers must avoid:

- treating ULOs as optional
- replacing outcomes with personal interpretations
- reducing the cognitive level because learners struggle
- delivering theory without action
- assuming the LU defines content, rather than performance

Once the expected output is clear, planning learning activities becomes significantly easier.

Next chapter explains how to design activities that enable the required performance.

Module 3 – Pedagogical Foundations for Digital Sustainability Training

Digital sustainability requires trainers to integrate technical, analytical and behavioural competences into learning experiences. This module provides the pedagogical foundations needed to deliver Learning Units in a way that ensures learner engagement, relevance to real-world practice and alignment with Unit Learning Outcomes.

The focus is on competence-based delivery: moving beyond content transmission towards learning activities that enable learners to demonstrate observable outcomes. Trainers will find guidance on how to select suitable methods, structure learning sessions and support diverse learner profiles across VET, higher education and workplace learning contexts.

The accompanying teaching and learning materials are designed to include examples of active learning activities aligned with the Learning Units defined in Digital4Sustainability curricula. These resources will be finalized and made available to support the piloting phase These resources will be finalized and made available to support the piloting phase. This module complements those resources by explaining the underlying pedagogical principles and offering additional method examples that trainers can adapt to their own context. It is intended to encourage trainers to think beyond the suggested activities and design learning experiences that remain outcome-aligned while responding to different learner profiles and delivery environments.

3.1. Core Pedagogical Principles

Delivery of the Digital4Sustainability curricula is shaped by four fundamental pedagogical principles. These principles help trainers **move beyond content transmission toward competence development**.

3.1.1. Adult Learning Orientation based on Knowls' Andragogy (1984)

Adult learners arrive with experiences, assumptions and contextual knowledge. Effective digital sustainability training:

- **activates what learners already know**

- **links new knowledge to their own workplace challenges**
- **focuses on problem-solving rather than memorising definitions**
- **supports learner autonomy and decision-making.**

The following table (Table 5) provides illustrative examples of how ULO verbs translate into activities.

Table 5. Illustrative Examples of Competence-Based Activities mapped to ULO Verbs

Example for Activating Prior Knowledge
Before introducing ESG indicators, the trainer asks participants how their organisation currently monitors energy consumption or carbon emissions. This creates a reference point and prepares learners to integrate new concepts meaningfully.
Example for Linking to Workplace Context
After explaining Green IT, participants compare two potential cloud solutions and discuss which better aligns with their organisation's ESG goals
Example for Problem solving situations
Instead of merely defining sustainable software, the trainer provides a challenge: "Your company operates an application that consumes excessive processing resources. What changes would you propose to reduce its environmental impact without compromising performance?" Learners apply concepts to solve a realistic problem rather than repeating definitions.
Example for Challenges
"You have a fixed budget and a strict delivery deadline. Which two sustainability improvements would you prioritise in your software system, and how would you justify the trade-offs?"
Example for Learner Autonomy and Self-direction
Following an introductory explanation, the trainer presents several task options—analysing an ESG dashboard, identifying cybersecurity risks in cloud-based systems, or evaluating the sustainability impact of a new digital solution. Participants choose the task most relevant to their role (e.g., a data analyst selects the dashboard task; a cloud engineer selects the security scenario).

3.1.2. Competence-Based Learning (Mulder, 2017)

Learning in Digital4Sustainability is not measured by what learners *remember*, but by what they can *demonstrate*. ULO verbs (e.g. analyse, configure, justify) define the expected behaviour.

Training must therefore enable learners to **produce observable evidence**, such as an analysis, configuration, plan or justification (Table 6).

Table 6.Active Learning Strategies and Methodological Examples for Trainers

Example – ULO Verb	Activity	Competence-Based Activity
Analyse	Analyse ESG performance data to identify improvement areas	Learners are given an ESG dashboard from a hypothetical company and must identify anomalies, trends or missing indicators, then justify which KPI should be prioritised for action.
Configure	Configure a digital sustainability monitoring system	Learners set up a sample monitoring dashboard or define API connections that capture sustainability-related data. The output is a functioning configuration—not a description of how it works
Evaluate	Evaluate alternative cloud solutions based on energy efficiency and compliance	Learners compare two cloud service providers based on carbon footprint data, security attributes and regulatory alignment. They present a recommendation with justification
Design	Design a sustainability data collection process aligned with organisational reporting needs	Learners draft a workflow that identifies data sources, tools, responsibilities and reporting cycles. The deliverable is a concrete artefact, not a summary of theory.
Justify	Provide a strategic rationale for selecting a specific digital sustainability solution over alternatives	Learners write or present a rationale comparing at least three strategic options, referencing energy impact, cost, scalability and ESG alignment.

Training is driven by **Learning Outcomes**, (Spady, 1994) not content coverage. A session is successful when learners:

- demonstrate behaviours aligned with ULO verbs (e.g., analyse, justify, configure),
- work with real or simulated data, systems or scenarios,
- produce visible evidence of competence.

3.1.3. Active Learning

Active learning (Prince, 2004) requires learners to *do something* that demonstrates thinking, decision-making or application.

Common active learning strategies in digital sustainability include:

- **micro-lecture + immediate task**
- **guided data exploration**

- **scenario-based challenges**
- **short case miniatures**
- **reflective prompts**
- **peer reasoning exchanges**
- **hands-on demonstrations**
- **mini projects.**

Below (Table 7) are methods with concrete examples directly tied to LUs.

Table 7. Constructive Alignment Mapping for Core Educational Profiles

Active Learning Strategy	Pedagogical Approach	Practical Illustrative Example
Micro-Lecture + immediate Application	5–10-minute concept introduction followed by a short task	After a micro-lecture on the EU Taxonomy, learners classify three investment scenarios and decide which qualify as "environmentally sustainable" according to taxonomy criteria.
Application Guided Data Exploration	Learners examine real or simulated datasets	Learners explore an ESG dataset showing energy use per department and identify which business unit presents the highest carbon reduction opportunity. They justify one concrete action to address it.
Scenario-Based Challenge	A realistic organisational dilemma with multiple valid solutions	"Your organisation must migrate its data infrastructure. Option A is cheaper but energy-intensive; Option B is greener but less flexible. Which do you choose and why?" Learners provide a strategic justification grounded in ESG principles.
Case Miniature	A short case (5–12 sentences) rather than a long case study	A startup deploys an AI model that consumes excessive GPU resources. Learners identify three improvements to reduce resource usage and explain the sustainability implications.
Reflective Prompt	One-minute structured reflection	"What digital practice in your organisation currently conflicts with sustainability goals—and what would be the first step to change it?" This encourages personalisation and ownership of learning.
Peer Reasoning Exchange	Two learners explain their reasoning to each other	Learners propose different approaches to measuring Scope 2 emissions. Each explains why their metric is more actionable, then refine their solution based on peer feedback.

Hands-On Demonstration	Demonstrate tool → learners replicate on their own	Trainer shows how to set up an energy monitoring dashboard. Learners configure one metric and export a report. (Note: Tools need not be real enterprise systems — demo datasets or mock platforms suffice.)
Mini-Project	20–60 min applied assignment tying everything together	Learners design a sustainability KPI set for a company, including the data source for each KPI, expected value range, and rationale. The output becomes evidence for assessment.

These methods are further supported through the accompanying learning materials, which include examples and activity suggestions aligned with selected LUs.

3.1.4. Constructive Alignment

Constructive alignment (Biggs, 1996) ensures that what learners do in the session directly enables what they must be able to demonstrate to meet the ULOs. It connects:

ULO → Learning Activity → Assessment Evidence

Trainers design backwards: **start with the ULO**, then select activities that produce the required evidence. Below are ***examples*** tailored to different types of Digital4Sustainability Learning Units present in Educational Profiles (Table 8) and Upskilling Curricula (Table 9).

Table 8. Constructive Alignment Mapping for Core Educational Curricula

	Components (Educational Profiles)		
Example of LU	**ULO description**	**Learning Activity**	**Assessment Evidence**
Data-focused LU (DAS / DPS profiles)	Analyse ESG performance data and identify improvement opportunities	Learners examine a dataset of energy usage across departments and discuss anomalies in pairs	Learners submit a short recommendation report proposing a priority action and justification
Digital Infrastructure (STS profile)	Configure a sustainability monitoring dashboard	Trainer demonstrates the interface; learners configure one KPI using provided data	Screenshot/export of the configured dashboard + brief explanation of metric relevance

Policy and Compliance (DSC/DSM Profiles)	Evaluate regulatory impacts on digital sustainability strategies	Small groups compare CSRD and EU Taxonomy implications for a hypothetical company	A written or oral justification of the recommended compliance approach

Table 9.Constructive Alignment Mapping for Upskilling Curricula

	Components (Upskilling Curricula)		
Example of LU	**Focus**	**Learning Activity**	**Assessment Evidence**
Circular Economy in Digital Systems	Application of resource efficiency and lifecycle thinking within digitally enabled circular business models.	Learners analyse the digital product lifecycle of an organisation and propose circular strategies (e.g., refurbishment, modular upgrades).	A short action plan outlining one circular intervention, its expected sustainability impact, and technical feasibility.
Cybersecurity for Sustainable Systems	Protection of data and system integrity while implementing energy-efficient security protocols for sustainability infrastructures.	Learners identify vulnerabilities in IoT-based monitoring and propose mitigation strategies that maintain resilience without increasing carbon footprint.	A risk matrix detailing vulnerability, security controls, and their estimated impact on system energy performance.

3.2. Quick-Reference Planning Toolbox

While section 3.1.3 provides the detailed pedagogical rationale for active learning, following toolbox (Table 10) is designed as a functional cross-mapping tool. Trainers should use this table during the Trainer Workflow (Module 4) to quickly align specific ULO verbs with the most effective instructional methods and the resulting evidence of learning.

Table 10. Summary of Micro-Methods and Recommended Application Scenarios

Instructional Method	Recommended for ULO Verbs	Primary Evidence Output
Micro-lecture	Identify, Describe, Define	Concept notes or quiz results

Guided data task	Analyse, Calculate, Interpret	Data report or dashboard export
Scenario challenge	Evaluate, Justify, Recommend	Written rationale or oral briefing
Reflective prompt	Reflect, Connect, Contrast	Reflection note or peer feedback
Hands-On Demo	Configure, Implement, Use	System screenshot or artefact
Mini project	Design, Create, Formulate	Portfolio or project proposal

No Learning Unit requires all methods; trainers select those that fit the ULOs and learner profile.

3.3. Adapting Delivery to EQF Levels

Different EQF levels require different degrees of autonomy and complexity. The following table (Table 11) provides an operational summary for trainers, focusing on the shift in learner autonomy as it directly impacts teaching methods. For the comprehensive, three-dimensional mapping of **Knowledge, Skills, and Responsibility** for each EQF level, trainers should refer to the official standards established in Digital4Sustainability curricula and LU profiles.

Table 11. Adaptation of Delivery and Trainer Focus across EQF Levels

EQF	Learner Autonomy (incl. Knowledge & Skills)	Trainer Focus
5	**Structured tasks** (Comprehensive knowledge; practical skills in a range of contexts)	demonstration + guided practice
6	**Moderate autonomy** (Advanced knowledge & critical understanding; advanced skills)	analysis, interpretation, comparison
7	**High autonomy** (Highly specialised knowledge; specialized problem-solving skills)	synthesis, judgement, strategic reasoning

Shortcut for trainers:

Read the ULO verbs. While verbs such as **analyse, evaluate, design, or justify** are strong indicators of EQF 6–7 cognitive demand, trainers should always cross-reference the full context and autonomy level specified in the **Digital4Sustainability Curricula – Learning Unit profiles**.

3.4. Adapting Delivery to Different Learner Backgrounds

Digital sustainability attracts learners from different backgrounds—technical, managerial, sustainability-oriented or beginners. Trainers should:

- clarify expectations at the start of each LU
- connect examples to learners' domains (IT, ESG, policy, operations)
- scaffold digital skills where required
- provide stretch tasks for advanced learners.

The approach to supporting diverse learners follows the principles of **Universal Design for Learning (UDL)** and differentiated instruction, ensuring that teaching methods are adapted to the specific prior knowledge and professional backgrounds of the participants.

CORE PRINCIPLE OF ADAPTABILITY: THE GOAL IS TO ADAPT THE LEARNING PATHWAY AND SUPPORT LEVEL, WHILE KEEPING THE ULOS UNCHANGED.

3.5. Practical Application in Digital Sustainability Context

The core challenge for trainers in this programme is the simultaneous delivery of digital and sustainability competences. To move from theory to practical application, trainers must ground all activities in the 'Twin Transition' context. The following scenarios represent the priority implementation domains established in DIgital4Sustainability curricula. When planning sessions, trainers should ensure that learners are not just performing technical tasks, but are doing so to solve specific sustainability dilemmas:

- **Analysing ESG reports:** Focus on the accuracy of data collection and its impact on corporate transparency.
- **Identifying cybersecurity risks:** Focus on protecting energy-critical infrastructure from digital threats.
- **Selecting digital solutions:** Focus on life-cycle assessment (LCA) and minimizing hardware emissions.
- **Mapping stakeholders:** Focus on aligning digital transformation with social and environmental goals.

If trainers ground activities in real decisions and tools, learners immediately see relevance and value.

Module 4 – Delivering Learning Units Effectively

The purpose of this module is to guide trainers through the practical process of transforming a LU from a curriculum document into a real learning experience that develops demonstrable competence. While the TTT Programme itself is self-paced, the piloting and delivery of LUs may take place in different formats, including online, hybrid or on-site settings. The strategies in this module are essential for the pilot phase but act as best-practice guidelines for all future deliveries.

Building on the pedagogical foundations presented in Module 3, this section translates those principles into a practical delivery workflow that trainers can apply before and during implementation. By the end of this module, trainers will be able to interpret a LU, translate ULOs into teaching and learning actions, plan a session logically and deliver it confidently across different institutional contexts.[2]

4.1. Understanding the Learning Unit You will Deliver

Each LU defines what learners must achieve through its **ULOs**. Trainers do **not** need to memorise the entire curriculum — only the LUs they will pilot (see section 3.3 for EQF level descriptors).

Key steps before delivery:

1. **Identify the LU** you are responsible for
2. **Read its ULOs** carefully — verbs indicate expected learner behaviour
3. **Determine Content Depth** → based on EQF level.
4. **Check dependencies** → Does this LU rely on prior knowledge (another LU or digital prerequisite)? Prerequisite information and LU dependencies are explicitly recorded in the Learning Unit specifications in Digital4Sustainability curricula.
5. **Clarify scope** → The LU defines *what must be achieved*, not a list of topics you must cover.

Trainer shortcut:

If you cannot describe in one sentence what learners must produce at the end of the LU, you have not yet understood the LU.

[2] Note for Project Partners: While the principles described here are universal for any competence-based delivery, trainers participating in the project's pilot phase should pay particular attention to the evidence collection requirements specified for reporting purposes (see Module 5 and Annexes).

4.2. Trainer Work-flow: From ULO to Delivery plan

Once the trainer understands the expected learner behaviour, the next step is to determine how that behaviour can be enabled through learning activities. This is a conceptual design phase in which the trainer selects methods, tasks and resources that guide learners toward the intended outcomes.

Where supporting LU materials are available, trainers may focus primarily on selecting, contextualising and facilitating these resources rather than designing activities from scratch.

Step 1 — Read the ULO(s)

Identify the action verb (e.g. analyse, justify, configure, evaluate, design, implement).

Step 2 — Choose a micro-method.

Select one or two suitable micro-methods that align with your ULO action verb. To ensure pedagogical consistency, please refer to the Quick-Reference Planning Toolbox in section 3.2. which provides the full mapping of verbs to instructional methods and evidence types.
Select one or two suitable micro-methods from Module 3 depending on the ULO verb.

Step 3 — Define the assessment evidence

Decide what the learner will produce to demonstrate ULO achievement. Evidence should be visible, authentic and aligned with the expected performance (not purely theoretical).

Step 4 —-Example of a session sequence

While session structures may vary depending on the LU context, the following pattern serves as an illustrative example:

1. **Short activation** (prior knowledge task)

   (e.g., "How does your organisation currently track energy use or emissions?")

2. **Micro-lecture** (concept framing)

   (e.g., 5–10 minutes on ESG metrics and why they matter for decision-making.)

3. **Active task** aligned with ULO verb

   (e.g., learners analyse a sample ESG dashboard and identify two anomalies and one improvement opportunity.)

4. **Evidence production**

(e.g., learners submit a short-written recommendation (5–8 sentences) or a completed template/table, and/or provide a screenshot/export of the dashboard configuration.)

5. **Brief reflection** (optional, but recommended)

   (e.g., "What would be the first practical step to apply this in your own context?")

Trainer confidence checkpoint:

If your learning activity reliably generates the evidence required for assessment, the LU delivery is aligned.

4.3. Assessment and Evidence Collection

Assessment confirms whether learners have achieved the Unit Learning Outcomes. In the Digital4Sustainability approach, assessment is not an additional activity at the end of teaching, but an integral part of the learning design process (Black & Wiliam, 1998). It focuses on short, observable outputs produced during the session, rather than on lengthy tests or theoretical essays.

Important clarification for trainers: The specific assessment instruments, criteria, and final formats for each Learning Unit are established within the specifications in Digital4Sustainability curricula. Trainers should apply these formats as provided in the accompanying Learning Material Packs to ensure consistency across different delivery settings.

The central question for trainers remains:

> ***What will learners produce that demonstrates the action required by the ULO?***

If a ULO requires learners to ***analyse***, they must analyse something; if it requires them to *justify*, they must justify a decision; if it requires them to ***configure***, they must configure a tool, workflow or system. The evidence type should mirror the ULO verb.

Completion and Reporting Criteria:

To ensure quality assurance during the implementation phase, the following criteria apply:

- **Formative assessment:** Continuous feedback provided during activities and through digital knowledge checks (e.g., integrated self-check quizzes).
- **Summative evidence**: Successful completion requires the submission of mandatory evidence (as specified in the Learning Material Packs).
- **Pilot Threshold:** For the project pilots, a 'Pass/Fail' model is used based on the alignment of the produced evidence with the intended learning outcomes.

Typical Evidence Types and Examples:

To keep evidence collection manageable and lightweight, trainers should prioritize simple outputs that directly confirm competence:

- **Short, applied tasks** — small, practical tasks linked to a dataset, scenario or case. *Example*: A prioritized list of three KPIs for an ESG dashboard with a brief explanation.
- **Digital knowledge checks** — automated or semi-automated checks integrated into the learning environment.
  Example: *Successful completion of a quiz covering EU Taxonomy regulatory requirements.*
- **Brief written justifications** — short explanations demonstrating understanding or analytical reasoning.
  Example: *A one-paragraph rationale for selecting a specific digital tool to monitor energy consumption.*
- **Configuration or demonstration outputs** — screenshots, exports, or other artefacts showing that a technical process has been completed.
  Example: A PDF export of a completed carbon footprint calculation or a screenshot of a configured IoT data stream.
- **Mini-reflections** — contextual reflections linking learning to workplace practice
  Example: *A brief note describing how a specific "Green ICT" principle could be applied in the learner's own organization.*

By selecting the evidence type early in the planning process, trainers can ensure that every instructional activity is purposefully directed toward a measurable result, fulfilling the requirements for both learner validation and project reporting.

4.4. Lesson Plan Design

The **Lesson Plan Template** (annexed) operationalises everything from one module. Trainers fill it once per LU to document:

- ULO(s) → what must be achieved
- Chosen teaching methods → how learners will work
- Evidence type → what will be produced
- Timing and sequence → flow of activities
- Materials/tools required → practical set-up

Once completed, the lesson plan becomes a **delivery script**: Following the plan supports consistency across different trainers and delivery settings while allowing contextualisation of examples and facilitation style.

4.5. Contextualizing Delivery Across Learning Environments

The Digital4Sustainability curricula cover different EQF levels, typically ranging from EQF 5 to EQF 7 across the core curricula and educational profiles, while the upskilling curricula are designed at EQF 5–6. Learning Units may therefore be delivered in a variety of learning environments, including VET providers, higher education institutions and workplace learning settings, as well as through online, hybrid or on-site formats.

To effectively contextualize delivery, it is highly recommended that trainers conduct a brief initial assessment or use a background questionnaire before the session starts. Understanding the learners' entry qualification level and professional experience allows the trainer to adjust the complexity of examples and the level of scaffolding. Furthermore, comparing this baseline data with the final evidence produced serves as a powerful tool to demonstrate learning gain (pre- and post-training comparison).

Contextualisation should focus on adapting how the Learning Unit is delivered to the learner group and setting, without changing what competence learners are expected to demonstrate. Trainers may adjust examples, scenarios and tools to reflect the learners' professional context, and vary the level of scaffolding and support depending on learners' prior knowledge and the targeted EQF level.

Typical contextualisation measures include learner profiling (recommended), using sector-specific cases, providing optional preparatory resources, offering guided templates, and differentiating tasks through basic and advanced pathways. Conducting an initial assessment or background survey to identify the learners' prior knowledge and professional experience will help the trainer to better adapt the delivery style and complexity to the group's needs.

The key requirement is that the Unit Learning Outcomes remain unchanged and that learners produce evidence demonstrating the intended performance level for the relevant curriculum.

In **VET settings**, trainers often provide more structure, concrete examples and guided steps. Learners benefit from clear modelling of the task before performing it independently.

In **higher education**, delivery may include stronger analytical framing and opportunities for comparative reasoning, critical reflection and open-ended tasks, while remaining aligned with the targeted EQF level and the ULO performance requirements.

In **workplace or industry-based training**, delivery is typically oriented towards immediate applicability. Learners may work with real organisational cases, datasets or current digital practices and connect learning directly to workplace processes and decision-making.

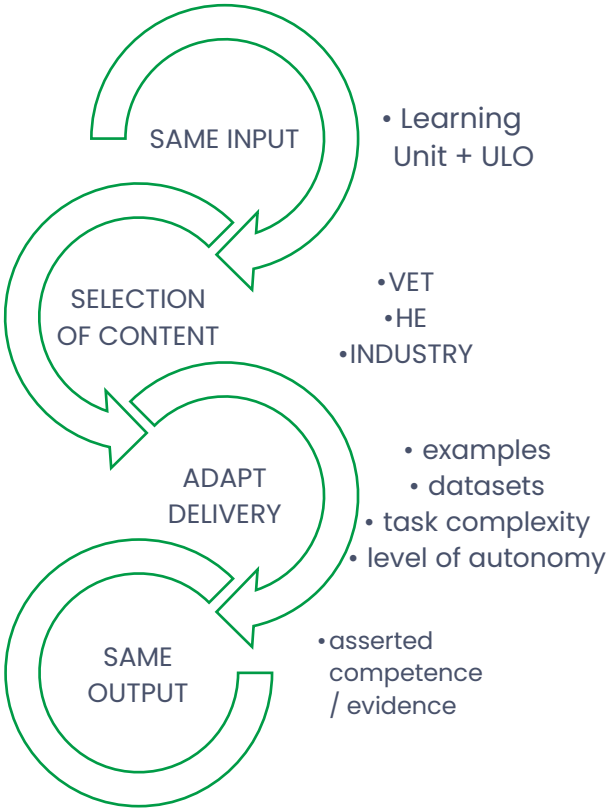

Figure 2. Quality Assurance and Feedback Loop during Project Implementation

This contextual flexibility ensures that the Digital4Sustainability curricula remain consistent in expected outcomes, while adaptable in delivery. Trainers do not change the ULOs; they adjust the learning pathway, support level and examples through which learners reach the intended performance.

Module 5 - Assessment and Pilot Reporting

The purpose of this module is to guide trainers in validating learner achievement and documenting the delivery process. To ensure the manual's long-term utility, we distinguish between **Educational Assessment** (the "what" and "how" of testing) and **Pilot Reporting** (the administrative evidence required for project verification).

The objective is to ensure that trainers follow a common approach, producing consistent and comparable evidence with minimal documentation.

5.1. Why Evidence Collection Matters

Evidence is required for three reasons:

1. **Learner Validation**
   Trainers must confirm that learners have achieved the Unit Learning Outcomes.
2. **Quality Assurance**
   Evidence supports evaluation of whether the Learning Units and curricula function as intended across different delivery contexts.
3. **Curriculum Refinement**
   Following the principles of Assessment for Learning (Black & Wiliam, 1998), feedback and evidence are used to refine teaching methods and learning materials.

Note for Project Partners: To ensure consistency across the consortium, a Minimum Evidence Set is required for each pilot session: (1) Attendance records, (2) Completed Lesson Plans, (3) Learner evidence artefacts, and (4) Standardized Feedback Forms.

5.2. What Trainers Should Collect

Trainers are responsible for capturing tangible evidence that corresponds to the action verbs in the ULOs.

Mandatory Evidence for Pilot Reporting:

- ✓ **Lesson Plan**
  (to show alignment between ULOs, methods and evidence).
- ✓ **Learner evidence** direct outputs from activities
  (e.g., dashboards, short rationales, micro-solutions, screenshots, written reflections).

- ✓ **Delivery Checklist**
  (confirming readiness, completion and key implementation notes).
- ✓ **Learner Feedback Form** feedback from learners
  (to identify challenges, motivation, and perceived relevance).
- ✓ **Trainer reflections**
  (a brief assessment of what worked and what needs revision, used for curriculum improvement).

Optional, but recommended:

- ✓ **Initial Learner Profile Data** for effective contextualization
  (Information collected at the start of the training to establish a baseline for measuring learning gain)

Note on Asynchronous/Self-Paced Delivery (e.g., IZZI):

In cases where the pilot is delivered in a strictly self-paced format without a dedicated trainer, the role of the 'Trainer' is replaced by a Content Administrator. Since certain interactive platforms may not automatically aggregate results, the following minimum evidence is required for reporting purposes:

- ✓ **User Access Log:** A list of registered participants provided with access to the platform.
- ✓ **Completion Artefact (Self-submission):** Learners are requested to submit a screenshot of their completed interactive results or the final summary screen from the platform.
- ✓ **Learner Feedback Form**: Learners must complete the project's online survey (e.g., Google Forms link) upon finishing the module
- ✓ **Trainer reflections** after piloting phase
  (a brief assessment of what worked and what needs revision, used for curriculum improvement).
- ✓ **Delivery Checklist**
  (confirming readiness, completion and key implementation notes).

Data Protection (GDPR): All evidence collection must strictly comply with Regulation (EU) 2016/679 (GDPR). Personal data must be minimized, and trainers must follow their institution's data

5.3. Evidence vs. Formal Assessment

In Digital4Sustainability curricula, it is important to distinguish between the collection of learning evidence and the process of formal assessment. While they are closely linked, they serve different purposes within the training life cycle. The overarching guidelines, assessment logic, and competence standards are established in document *Digital4Sustainability Educational Profiles and Core Curricula*. This document ensures that regardless of the training provider, the assessment remains aligned with European standards (EQF, e-CF, and GreenComp). While this document provides the framework, the detailed operational instructions on *how* to conduct assessment are housed within the specific **Learning Material Packs.**

Trainers should encounter three primary forms of assessment-related activities:

- **Formative Assessment:** Handled through integrated digital knowledge checks (self-check quizzes) and continuous feedback during F2F/PBL activities.
- **Summative Assessment:** Detailed tasks, rubrics, and criteria for formal grading (e.g., capstone projects, case studies) are defined within the specific **Learning Material Packs**.
- **Pilot Phase Standard:** For project purposes, successful completion is based on a **'Pass/Fail'** model, determined by the alignment of the submitted evidence with the intended ULOs. To ensure transparency, the passing threshold is set at a minimum of 60% for automated module exams, or meeting the minimum acceptable criteria defined in the Capstone grading rubrics.

Trainers are responsible for facilitating these assessments as described in the instructional materials. They should ensure that the evidence collected is sufficient to demonstrate the required level of competence and is documented using the standardized forms provided in the Annexes of this manual.

For **self-paced digital delivery** (e.g. IZZI), assessment focuses on automated formative checks within the platform. However, for project reporting and final module assessment, the completion of these checks or final module exams (administered via external tools like MS Forms/Google Forms) must be verified. Trainers/Administrators should instruct learners to capture their final progress (e.g., via screenshot) or submit their passing exam results and submit it as evidence of achievement as mentioned in chapter 5.2.

5.4. How to Document Learning Evidence

Evidence should be:

- ✓ **Visible** — trainers must be able to show what the learner did
- ✓ **Traceable** — it must connect to a specific ULO
- ✓ **Lightweight** — short, focused, authentic
- ✓ **Reusable** — suitable for review, feedback and (where relevant) reporting.

The specific evidence requirements are pre-defined in the Learning Unit designs; the trainer's role is to ensure these artefacts are captured and archived correctly.

Examples of acceptable evidence types:

Table 12. Acceptable Evidence Types for Documenting Learning Unit Achievement

Evidence Type	Suitable For	Example Output (where available)
Applied task	F2F workshop activities	A table prioritising KPIs based on sustainability impact
Digital Artefacts	Online / Self-paced / Asynchronous	Automated quiz scores, digital logs or badges
Technical Outputs	Technical/Data Units	PDF export of a configuration or system screenshots.
Digital Learning Logs / Interactive Artefacts	Asynchronous or Self-paced delivery (e.g. IZZI)	digital logs, quiz scores, time-on-task reports
PBL Deliverables	Project-Based Learning	A comprehensive strategy document or rationale.

Important:

A learner explaining a concept aloud without producing an artefact may be useful for learning, but it does not provide traceable evidence unless it is captured through a structured output (e.g., a checklist, short written response, submitted template, or recorded deliverable where appropriate and permitted).

5.5. Roles and Responsibilities During Piloting

Roles may vary by institution and delivery setting, but a typical responsibility split is:

Table 13. Distribution of Roles and Responsibilities during the Piloting Phase

Role	Responsibility
Trainer	Delivers the LU, support learners, collects evidence and ensures learners complete the Feedback Form (see Annex 4).
Content Administrator	Only applicable for self-paced delivery (e.g. IZZI)
Institution/provider	Stores documentation and ensures data protection compliance
Project piloting coordination partner	Aggregate and analyse implementation data
Curriculum development teams	Use findings to improve curricula and learning units

Trainers are not responsible for system-level reporting, they only collect and submit materials using provided templates.

Note for Project Pilot Partners: *While trainers outside this project may adapt these forms, partners participating in the project pilot must use the provided templates to ensure data comparability.*

5.6. Ensuring Quality and Consistency

Consistency across delivery context is supported by:

- ✓ using the **same TTT guidance and curriculum documents**
- ✓ **aligning activities with ULO verbs**
- ✓ **selecting appropriate evidence that demonstrates ULO achievement**
- ✓ **using common forms and templates**
- ✓ **adhering to the standardized module structures and rubrics provided in the Learning Material Packs.**

A trainer in Spain and a trainer in Netherlands may teach different examples, but as long as the **observable evidence** matches the ULO, the outcomes are comparable. Comparability is ensured through these common criteria, regardless of the delivery context.

5.7. Feedback and Curriculum Improvement

Evidence and feedback collected during implementation supports continuous improvement of the Digital4Sustainability curricula and resources. Findings may lead to updates in Learning Units, adjustments in learning materials, refinement of activity guidance, and improvements to assessment design.

This ensures that the Digital4Sustainability curricula evolve based on real-world delivery and learner experience, rather than assumptions. To operationalize this, the improvement process follows a systematic cycle: (1) Collection of qualitative and quantitative implementation data, (2) Thematic analysis of feedback and barriers by the curriculum development teams, and (3) Periodic refinement of the 'Ready-to-Use' learning materials.

Module 6 – Learning Materials and Digital Resources

This module explains which resources support trainers in delivering Learning Units and participating in the piloting and implementation activities. The Digital4Sustainability Train-the-Trainer Programme has been intentionally designed as **lightweight, self-paced and platform-independent**, meaning it can be used across different institutional environments (e.g., internal learning platforms, shared repositories or simple web-based access points).

The materials are modular, downloadable and editable, allowing trainers to adapt them to their organisational or national context.

6.1. Trainer Handbook

The Trainer Handbook (this document) is the primary reference for all trainers. It explains:

- ✓ a complete explanation of curriculum structure and concepts
- ✓ pedagogical foundations for competence-based delivery
- ✓ instructions for working with Learning Units and ULOs
- ✓ guidance on assessment and evidence collection
- ✓ templates and tools required for piloting
- ✓ clarification of trainer roles and responsibilities

The Handbook is not a script for teaching; it is a **navigation tool** enabling trainers to confidently interpret and apply curriculum consistently across different contexts.

6.2. Upskilling Curriculum Learning Materials Pack

In addition to the TTT, the project provides a Learning Materials Pack (LMP) developed for the six upskilling curricula established in Digital4Sustainability curricula. To support different learning needs, these materials are organized into two distinct instructional delivery models:

A. Digital-First Interactive Modules

The following curricula are primarily delivered via the **project's interactive digital environment (IZZI platform)**, focusing on self-paced foundational knowledge and regulatory frameworks:

- **Digital Sustainability Foundations (LU01)**
- **EU Policy and Legislation for Sustainability (LU50)**

Key components: Interactive multimedia lessons with automated self-check quizzes.

B. Blended Learning Comprehensive Packages

The following curricula follow a comprehensive four-pillar template (Handbook, F2F, PBL, and Video) designed for deeper competence building and practical application:

- **Circular Economy in Digital Systems (LU41)**
- **Cybersecurity for Sustainable Systems (LU46)**
- **Green Software Fundamentals (LU05, LU12)**
- **Sustainability Data Essentials (LU39)**

Key components per curricula:

- **Student Handbook:** Main theoretical reference.
- **Face-to-Face (F2F) Guide:** Scenarios for facilitated workshops.
- **Project-Based Learning (PBL) Tasks:** Real-world workplace assignments.
- **Instructional Videos:** Expert briefings on key concepts.

For trainers, these packs operationalize the curriculum design by providing all necessary instructions and assessment rubrics required for the pilot phase and beyond.

6.3. Templates and Checklists

The TTT programme provides practical tools that trainers can use across LUs and curricula:

1. **Lesson Plan Template**
   Maps ULOs to teaching activities, methods and evidence outputs.
2. **Trainer Preparation Checklist**
   Used before delivery to confirm readiness (resources, access, delivery plan).
3. **Delivery Checklist**
   Completed after delivery to document completion, challenges and learner engagement.
4. **Learner Feedback Form**
   Allows learners to share perceptions of relevance, workload, clarity and barriers.

All files are editable and may be adapted to local, organisational or sectoral contexts.

6.4. Online Resource Hub

All TTT resources, including this Handbook, templates and checklist are hosted on the Digital4Sustainability central Resource hub - project website. While the primary TTT handbook is a public document, access to certain **operational instructional resources** (such as editable templates for trainers) may be managed via a **secure partner area** to ensure quality control and protect the consortium's intellectual property.

6.5. Localization and Adaptation

The materials are designed to be adaptable. Trainers may modify:

- case examples,
- terminology and illustrations,
- delivery format (online, blended, classroom),
- sector-specific applications,
- language.

The Unit Learning Outcomes must remain unchanged, as they ensure alignment across different delivery context.

6.6. Recommended Sequence for Trainers

Trainers should follow this streamlined process:

1. **Review this Handbook** to understand the curricula and delivery logic.

2. **Identify the Learning Units to deliver**, based on the selected curriculum component and implementation context (see Module 2).
3. **Use the Lesson Plan Template** to select methods, examples and evidence aligned with ULOs.
4. **Deliver the Learning Unit** using the pedagogical strategies from Module 3 and delivery workflow from Module 4.
5. **Collect evidence** for validating the piloting results following the procedures described in Module 5.

This supports a coherent delivery approach while allowing trainers to contextualise examples and activities to their learners and setting.

Module 7 — Trainer Competency Framework

High-quality delivery of the Digital4Sustainability curricula depends not only on well-designed LUs but also on trainers who can interpret, translate and facilitate competence-based learning in diverse educational environments. Module 7 defines the core competencies that trainers must demonstrate to ensure consistent, effective and learner-centred delivery across different contexts.

This framework does not certify trainers. Rather, it provides a **reference standard** that trainers can use to self-assess readiness, identify development needs and align their practice with the expectations of the Digital4Sustainability programme.

7.1. Competency Areas

The Trainer Competency Framework focuses on five core areas that directly support the delivery of LUs.

1) Pedagogical Competence (Aligned with DigCompEdu):

Trainers can:

- ✓ plan sessions aligned with Unit Learning Outcomes (ULOs)
- ✓ apply active, learner-centred methods
- ✓ facilitate learning in mixed-experience groups
- ✓ guide reasoning, not only present information

- ✓ design and implement learning sequences that utilize digital tools to enhance collaborative learning.

In practice: Trainers enable learners to do something meaningful during the session, not merely listen.

2) Digital Competence (Aligned with DigComp 2.2):

Trainers can:

- ✓ use digital tools required for teaching and evidence collection
- ✓ explain or demonstrate core digital concepts present in the piloted Learning Units
- ✓ support learners with varying levels of digital readiness
- ✓ evaluate the credibility and environmental footprint of digital resources used in training

In practice: Trainers do not need to be software developers but must confidently navigate tools and data used in the LU.

3) Sustainability Competence (Aligned with GreenComp)

Trainers:

- ✓ understand foundational sustainability concepts and relevant policy drivers
- ✓ can connect digital decisions to environmental and organisational consequences
- ✓ promote systems thinking and responsible action
- ✓ *f*acilitate discussions on ethical dilemmas related to the twin transition (digital-green)
- ✓ support learners in envisioning sustainable futures through systemic thinking.

In practice: Trainers contextualise digital choices within ESG and sustainability strategies.

4) Professional and Communication Skills

Trainers:

- ✓ communicate concepts clearly
- ✓ structure and facilitate discussions
- ✓ manage learner expectations and time
- ✓ give concise, constructive feedback

In practice: Trainers enable interaction and shared meaning-making, not one-way transmission. This area combines professional ethics with communication to ensure trainers can effectively bridge the gap between technical data and stakeholder engagement

5) Assessment and Evidence Competence

Trainers:

- ✓ select appropriate evidence types aligned with ULO verbs
- ✓ collect visible and relevant evidence of learning
- ✓ use templates to document delivery and outcomes

In practice: Trainers know exactly what output demonstrates learning and ensure it is produced and captured in an appropriate format.

7.2. Competencies Required for Different Learning Units

Not every trainer must demonstrate the same depth across all domains. The required focus depends on the type of LU being delivered.

Table 14. Required Trainer Focus and Competency Areas per Learning Unit Category

Type of LU	Required Trainer Focus
Technical (e.g., cloud, cybersecurity)	digital competence + hands-on guidance
Data-oriented (e.g., ESG dashboards, analytics)	data literacy + interpretive skills
Policy and regulatory LUs	sustainability and compliance understanding
Managerial/strategic LUs	stakeholder engagement + decision-making facilitation

Note: While the table highlights the primary focus for each LU type, many units are interdisciplinary. Trainers are encouraged to draw upon combined competencies (e.g., combining data literacy with sustainability policy) as required by the specific LU context established in Digital4Sustainability curricula.

7.3. Self-Assessment for Trainers

Before delivering LUs, trainers are encouraged to complete a short self-check covering the five competency areas. The aim is not to filter out trainers, but to:

- clarify strengths
- identify where support or co-teaching may be useful
- ensure trainers feel confident before delivery

Example reflection prompts:

- *Can I clearly explain what the ULO requires the learner to demonstrate?*
- *Can I select at least one active method aligned with the ULO verb?*
- *Am I able to collect meaningful evidence within the time available?*
- *Can I explain how digital solutions in this LU contribute to specific EU Green Deal objectives?*
- *Do I feel confident in troubleshooting the basic digital tools required for this unit?*
- *Am I prepared to handle diverse learner questions regarding regional sustainability regulations?*

A trainer who can answer **yes** to these questions is ready for delivering a Learning Unit.

What Trainers Can Do After Completing the TTT Programme

As established in the introductory goals of this manual, trainers who have worked through the modules are now equipped to:

- ✓ understand the architecture of the Digital4Sustainability curricula, including the role of LUs, PLOs, ULOs and competence frameworks
- ✓ interpret a LU and translate its ULOs into aligned learning activities
- ✓ deliver sessions using active, outcome-driven pedagogical approaches
- ✓ design lightweight, authentic assessment aligned with ULO verbs
- ✓ support diverse learner profiles across VET, higher education and workplace settings
- ✓ document delivery using provided templates and checklists
- ✓ engage confidently in discussions about curriculum relevance, learner needs and sustainability implications

Trainers are therefore not just implementers. They play an important role in strengthening digital sustainability competences through practical delivery and feedback.

How the TTT Fits into the Digital4Sustainability Project

The TTT Programme is a bridge:

- between **curriculum design** and real-world delivery
- between **learning outcomes** and demonstrable competence
- between **digital competence** development and **sustainability capacity building.**

It supports trainers in ensuring that the curricula can be understood, adopted, adapted and delivered in multiple institutional and organisational contexts.

What Happens Next

Trainers can now:

- ✓ finalise lesson plans for the Learning Units they will deliver
- ✓ deliver LUs in their chosen format
- ✓ collect evidence and implementation reflections using the templates
- ✓ provide feedback that supports continuous improvement of the curricula and materials.

Recommendations for Future Consideration:

- more Learning Units being added
- localisation and sector-specific adaptations
- communities of practice across training providers
- potential pathways for trainer recognition or credentials.

The TTT manual is designed as a **dynamic framework**. It serves as a foundation for consistent, competence-based delivery and is subject to continuous refinement as the digital sustainability landscape evolves

Resources

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Links

- Anderson and Krathwohl Bloom's Taxonomy Revised https://quincycollege.edu/wp-content/uploads/Anderson-and-Krathwohl_Revised-Blooms-Taxonomy.pdf
- Digital Competence Framework 2.2. (DigComp 2.2) https://publications.jrc.ec.europa.eu/repository/handle/JRC128415
- Digital Competence Framework for Educators (DigCompEdu) https://joint-research-centre.ec.europa.eu/digcompedu_en
- Europe's Digital Decade https://digital-strategy.ec.europa.eu/en/policies/europes-digital-decade
- The EU Green Deal https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en
- GreenComp https://joint-research-centre.ec.europa.eu/greencomp-european-sustainability-competence-framework_en

Annexes

These annexes are part of **Train the Trainer Programme** (**Deliverable D3.5).** This document contains the four core templates used to support trainers during preparation and delivery of-the Digital4Sustainability Learning Units. Templates are provided in editable format (.docx) to allow partner-level adaptation and translation.

Annex 1. Lesson Plan Template

Lesson Plan Template (Learning Unit Delivery)

*Please refer to the **Learning Unit specifications in Digital4Sustainability curricula** and the specific assessment rubrics provided in the **Learning Material Packs (LMP)** to identify the required mapping between ULOs and evidence artefacts.*

Field	Description
Learning Unit (LU) Title	
Modules and Topics	
EQF level	
Trainer Name(s)	
Session Date & Duration	
Relevant Unit Learning Outcomes (ULOs)	(e.g. Analyse ESG data)
Teaching Methods Used	(e.g., micro-lecture, case miniature, short exercise, guided discussion)
Session Outline (Timing & Activities)	- Introduction (5 min) - Core activity 1 - Core activity 2 - Reflection / wrap-up *(editable for any format)*
Materials / Tools Needed	
Assessment Method(s)	(e.g., short applied task, interpretation exercise, reflection)
Evidence of Learning	(e.g. Screenshot of the configuration)
Notes for Delivery / Adaptation	

Annex 2. Trainer Preparation Checklist

Before delivering the Learning Unit, the trainer should confirm the following:

Trainer Preparation Checklist
Curriculum Readiness ☐ I have reviewed the relevant Learning Unit(s). ☐ I can explain how the digital solutions in this LU contribute to specific EU Green Deal objectives. ☐ I have reviewed regional/national sustainability regulations relevant to this LU to address potential learner inquiries. ☐ I understand the ULOs and EQF level requirements. ☐ I have prepared a Lesson Plan using the provided template.
Pedagogical Preparation ☐ I have selected appropriate teaching methods. ☐ I have planned at least one active learning activity. ☐ I have prepared examples relevant to learners' backgrounds.
Technical Preparation ☐ All required digital tools, data sets or slides are ready. ☐ I have tested any tools or files used in the session. ☐ The room/platform (in-person or online) is confirmed and functional. ☐ I have tested and am able to troubleshoot the basic digital tools and platforms required for this unit.
Administrative Readiness ☐ Attendance list is prepared (institution-specific). ☐ Learner Feedback Forms are available. ☐ I know how to document the session for Project Quality Reporting and Pilot Evaluation.
Personal Readiness ☐ I have verified my pedagogical and technical readiness based on the criteria in the Trainer Competency Framework (Module 7) ☐ I have the contact details for the project's technical and support team. ☐ I have reviewed timing and session flow.

Annex 3. Delivery Checklist

Delivery Checklist

To be completed after each Learning Unit delivery.

Basic Information	
Trainer name:	
Learning Unit delivered:	
Modules/Topics delivered:	
Date and duration:	
Number of participants:	
Delivery Summary ☐ The session was delivered according to the Lesson Plan. ☐ All ULOs were addressed. ☐ Planned teaching methods were used. ☐ The session stayed within expected workload and timing.	
Learner Engagement ☐ Learners participated actively. ☐ No major difficulties with instructions or tools. ☐ Additional support was not needed.	
Assessment ☐ Assessment tasks were completed. ☐ Evidence has been collected and shared with Delivery and Evaluation team (as specified in section 5.2).	
Logistics & Practical Notes ☐ Tools and materials worked as intended. ☐ The room/platform was adequate. ☐ No technical issues occurred (if yes specify below).	

Trainer Reflection (Please provide brief notes on the following, max 200 words total):

1. ***What worked well regarding the learning materials?***
2. ***Which specific ULOs were most challenging for the learners?***
3. ***Did you face any technical issues?***
4. ***Recommendations for improving the content or activities?***

Annex 4. Learner Feedback Form for Synchronous delivery

Learner Feedback Form — Digital4Sustainability Learning Unit

(Anonymous unless otherwise required by institution)

Session Information	
Learning Unit name:	
Date:	
Partner Institution/Country:	
Delivery Modality:	☐ In-person ☐ Online ☐ Blended
Learner's Professional Sector:	☐ IT ☐ Sustainability / ESG ☐ Management ☐ Other: _____
Learner's Level / Role	☐ Student ☐ Employee ☐ Manager ☐ Other: _____

Please rate the following (1 = disagree, 4 = fully agree)

Topic	Statement	1	2	3	4
Course structure & content	The course was well organized	☐	☐	☐	☐
	The quality of the content was high	☐	☐	☐	☐
	The course was interesting.	☐	☐	☐	☐
	The session was relevant to my work/studies.	☐	☐	☐	☐
Trainer-related items	The trainer explained concepts effectively	☐	☐	☐	☐
	The session was clear and easy to follow	☐	☐	☐	☐
	The activities helped me understand the topic	☐	☐	☐	☐
Learning Level & Progress	The level of difficulty was appropriate	☐	☐	☐	☐
	I have increased my knowledge on this topic	☐	☐	☐	☐

Overall satisfaction	Overall, I am satisfied with the quality of this training unit	☐	☐	☐	☐
	I would recommend this training unit to other colleagues or students.	☐	☐	☐	☐

Open Questions (Please provide brief notes on the following, max 200 words total):
1. ***What did you find most useful in this session?***   2. ***Do you have any suggestions to improve the content, materials, or delivery?***

Overall satisfaction with the education:
☐ Overall, I am satisfied with the quality of this training unit
☐ I would recommend this training unit to other colleagues or students.

Annex 4a. Learner Feedback Form for Self paced/Asynchronous delivery

Learner Feedback Form — Digital4Sustainability Learning Unit

(Anonymous unless otherwise required by institution)

Session Information	
Learning Unit name:	
Date:	
Partner Institution/Country:	
Delivery Modality:	☐ In-person ☐ Online ☐ Blended
Learner's Professional Sector:	☐ IT ☐ Sustainability / ESG ☐ Management ☐ Other: _____
Learner's Level / Role	☐ Student ☐ Employee ☐ Manager ☐ Other: _____

Please rate the following (1 = disagree, 4 = fully agree)

Topic	Statement	1	2	3	4
Course structure & content	The course was well organised	☐	☐	☐	☐
	The quality of the digital learning materials was high	☐	☐	☐	☐
	The learning itinerary was clear and easy to follow	☐	☐	☐	☐
	The course was interesting	☐	☐	☐	☐
	The course was relevant to my work/studies	☐	☐	☐	☐
Learning experience & progress	The activities/resources helped me understand the topic	☐	☐	☐	☐
	The level of difficulty was appropriate	☐	☐	☐	☐

	I have increased my knowledge on this topic	☐	☐	☐	☐
Overall satisfaction	Overall, I am satisfied with the quality of this training unit	☐	☐	☐	☐
	I would recommend this training unit to other colleagues or students.	☐	☐	☐	☐

Open Questions (Please provide brief notes on the following, max 200 words total):
1. ***What did you find most useful in this session?***   2. ***Do you have any suggestions to improve the content, materials, or delivery?***

Overall satisfaction with the education:
☐ Overall, I am satisfied with the quality of this training unit
☐ I would recommend this training unit to other colleagues or students.

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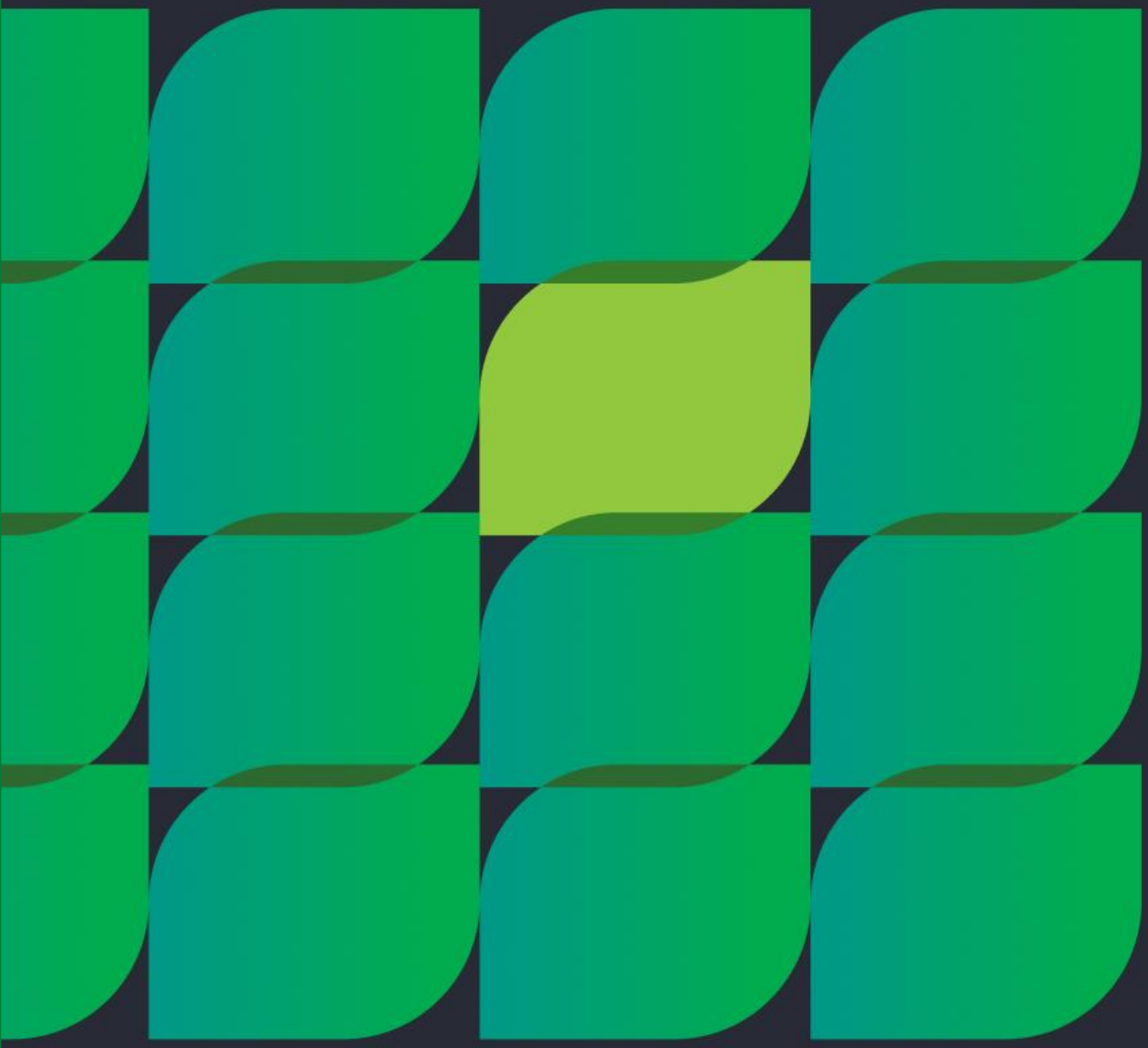

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