D7.7 DIGITAL ASSESSMENT AND DEMONSTRATION TOOLKIT

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DIGITAL TECHNOLOGY ASSESSMENT AND DEMONSTRATION TOOLKIT, DRAFT AT M36

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1 Introduction

This report documents four tools for CODECS researchers and stakeholders to assess technologies and their impacts: (i) an environmental footprint calculator, (ii) an economic cost calculator, (iii) a technology assessment tool for users, and (iv) a multicriteria assessment tool. It also provides a brief overview of the performance demonstration toolkit, which will integrate assessment outputs and be developed in Task 7.5.

Target audience: tool developers, users, researchers involved in assessments, and other interested persons.

2 Environmental Footprint Calculator (EFC)

2.1 Objective

The Environmental Footprint Calculator (EFC) is a web-based tool using Life Cycle Analysis (LCA) to assess the environmental impacts of digital technologies in agricultural production. It enables farmers, advisors, educational institutions, and policymakers to evaluate and reduce environmental footprints by simulating scenarios and visualizing outcomes. By comparing agricultural processes before and after digitalization, the EFC provides insights into sustainability, focusing on direct farm impacts, such as soil depletion and biodiversity loss. The tool supports storytelling through real-world use cases, such as the DOPPLER project in Slovenia, to demonstrate the practical benefits of digital technologies in agriculture.

2.2 Functions

The Environmental Footprint Calculator (EFC) is a web-based tool designed to evaluate the environmental impacts of digital technologies in agricultural production through Life Cycle Analysis (LCA). By providing actionable insights into sustainability, it enables farmers, agricultural advisors, educational institutions, and policymakers to assess and mitigate environmental footprints, focusing on direct farm impacts such as soil depletion and biodiversity loss. The EFC compares agricultural processes before and after digitalization, offering a clear understanding of how digital tools influence environmental outcomes. It also supports storytelling through real-world use cases, such as the DOPPLER project in Slovenia, to demonstrate the practical benefits of digital technologies in agriculture. Developed within Work Package 4 (Task 4.1), the EFC's core functions include data collection and LCA calculations. Data collection gathers critical information required for analysis, ensuring a robust foundation for evaluating environmental impacts. LCA calculations compare agricultural practices before and after adopting digital technologies, highlighting changes in environmental performance, particularly in areas like soil health and biodiversity.

The EFC is equipped with several essential functions to enhance its usability and effectiveness. The General Description of Focal Action Situation (FAS) provides a structured framework for analyzing specific agricultural scenarios. Each use case is defined by a title and a detailed description, including the type of agricultural production and specifics about the digital technology, such as its features and services. The FAS includes two scenarios: a Reference Scenario, which describes the agricultural process without digital technology as a baseline, and a Digital Scenario, which outlines the process with digital technology, highlighting changes and their environmental implications. By comparing these scenarios, users can clearly see the environmental benefits of adopting digital tools.

Data visualization is another key function, presenting LCA results in intuitive formats like graphs, charts, and impact maps. These visualizations make complex data accessible and actionable, allowing users to quickly identify key areas of environmental impact, such as reductions in soil depletion or improvements in biodiversity. Effective visualizations are critical for communicating results to diverse audiences, ensuring insights are easy to understand and apply. The scenario simulation function allows users to experiment with different agricultural practices by adjusting input parameters and observing the resulting environmental impacts. This interactive feature enables users to simulate "what-if" scenarios, such as changing crop management techniques or adopting new digital tools, and

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instantly see how these changes affect their environmental footprint. For example, a farmer could simulate the impact of precision irrigation on soil health, aiding informed decision-making.

Hotspot identification is a critical function that pinpoints steps in the production process with significant environmental impacts. By highlighting these hotspots, the EFC helps users prioritize interventions that yield substantial environmental benefits, such as adopting AI-based crop monitoring to reduce pesticide use. The tool's design makes it versatile for various users. Farmers can optimize practices to reduce environmental impacts while maintaining productivity, advisors can provide data-driven recommendations, educational institutions can incorporate the EFC into curricula to teach sustainable agriculture, and policymakers can develop regulations and incentives to promote environmentally friendly farming.

The integration of real-world use cases, like the DOPPLER project, enhances the EFC's storytelling capabilities, showcasing tangible benefits such as reduced soil depletion or enhanced biodiversity. Pre-set results from Living Labs ensure outputs are grounded in real-world data, increasing relevance and reliability. The EFC bridges the gap between technology and environmental stewardship, empowering users to make informed decisions that enhance sustainability in agriculture. Its focus on direct farm impacts, combined with robust data collection, LCA calculations, and user-friendly features, makes it a powerful tool for fostering a more sustainable future in agricultural production.

2.3 Progress in 2025

Since the last deliverable (D7.6, September 2024), the EFC has undergone significant advancements to enhance its functionality, user experience, and applicability to real-world agricultural settings. Key developments include:

- **Enhanced Data Integration**: The EFC now integrates real-time data from an expanded network of soil, leaf, and water sensors, improving data accuracy by 20% compared to 2024. This upgrade enables more precise monitoring of environmental parameters, such as soil moisture, nutrient levels, and water quality, which are critical for sustainable viticulture.
- **User Interface Improvements**: The tool's interface, built using React (TypeScript, MUI) and Next.js, has been upgraded to a fully interactive dashboard. Users can now input variables (e.g., irrigation levels, fertilizer use) and instantly visualize their environmental impacts through dynamic charts, graphs, and impact maps. This interactivity enhances user engagement and decision-making.
- **Visualization Enhancements**: New visualization features include bar charts comparing digital and non-digital scenarios, heatmaps identifying environmental impact hotspots, and trend graphs showing changes over time. These tools make complex LCA data accessible to non-expert users, such as farmers and advisors, by presenting results in an intuitive format.
- **Expanded Deployment in Slovenia**: The EFC has been deployed across 15 vineyards in the DOPPLER use case, up from 10 in 2024, achieving an 18% reduction in environmental footprint (improved from 15% in D7.6). Specific reductions include 12% in ozone depletion and 10% in marine acidification, demonstrating the tool's effectiveness in real-world settings.
- **Algorithm Optimization**: The EFC's LCA algorithms were refined in collaboration with WP4 (T4.1), incorporating advanced data processing techniques to reduce computation time by 25%. This improvement allows for faster generation of reports, enabling timely decision-making for farmers.
- **Scalability**: The EFC's database structure was expanded to accommodate additional use cases beyond viticulture, such as crop farming and livestock management, making it adaptable to diverse agricultural contexts.

These advancements build on the foundational work outlined in D7.6, where the EFC's initial framework was established, including its database structure and preliminary visualizations. The 2025 updates reflect iterative feedback from Living Lab coordinators and partners, ensuring the tool meets user needs.

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2.4 Doppler Winery

Context

The Slovenian wine region is increasingly challenged by climate change, with rising temperatures, irregular precipitation, and soil degradation posing serious threats to sustainable viticulture.. The DOPPLER project addresses these issues by deploying a network of digital sensors and cameras to monitor and optimize wine production, aiming to reduce environmental impacts while maintaining economic viability and improving social conditions for local communities.

2.4.1 Process

The EFC's application in DOPPLER follows a structured process:

1. **Sensor Deployment**: Soil, leaf, and water sensors, alongside high-resolution digital cameras, were installed across 15 vineyards in 2025. These sensors collect real-time data on environmental parameters, such as soil moisture, nutrient content, water quality, and canopy health.
2. **Data Transmission**: Sensors are connected to a gateway that relays data to a central server. The system uses secure, low-latency communication protocols to ensure reliable data transfer, even in remote vineyard locations.
3. **Analysis and Reporting**: The server processes incoming data using LCA methodologies, generating detailed reports on environmental impacts. These reports are visualized on the EFC's interactive dashboard, allowing users to explore metrics like carbon emissions, water usage, and energy consumption.
4. **Scenario Simulation**: The EFC enables users to simulate different production scenarios (e.g., adjusting irrigation schedules or reducing fertilizer use) and compare their environmental outcomes against a baseline non-digital scenario. This feature supports farmers in making data-driven decisions to optimize sustainability.

2.4.2 Results

The EFC's application in DOPPLER has yielded significant environmental benefits:

- **Environmental Footprint Reduction**: The digital scenario achieved an 18% reduction in overall environmental impact compared to non-digital methods, with specific improvements in ozone depletion (12%), marine acidification (10%), and water usage (15%). These gains are attributed to optimized resource management enabled by real-time sensor data.
- **Fuel Use Challenge**: Despite progress, fuel consumption remains a dominant contributor to environmental impacts, accounting for over 50% of the footprint in some scenarios. This highlights the need for further innovation in energy-efficient technologies.
- **Soil Degradation**: While the EFC has improved monitoring of soil health, degradation remains a challenge due to intensive viticulture practices. Ongoing work focuses on optimizing sensor placement to better address this issue.
- **User Adoption**: Feedback from Slovenian farmers indicates high satisfaction with the EFC's intuitive interface, with 85% reporting improved decision-making due to actionable insights from the dashboard.

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Figure 1: mock-up of user interface (latest version), possible visualization

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Figure 2: mock-up of user interface (latest version)

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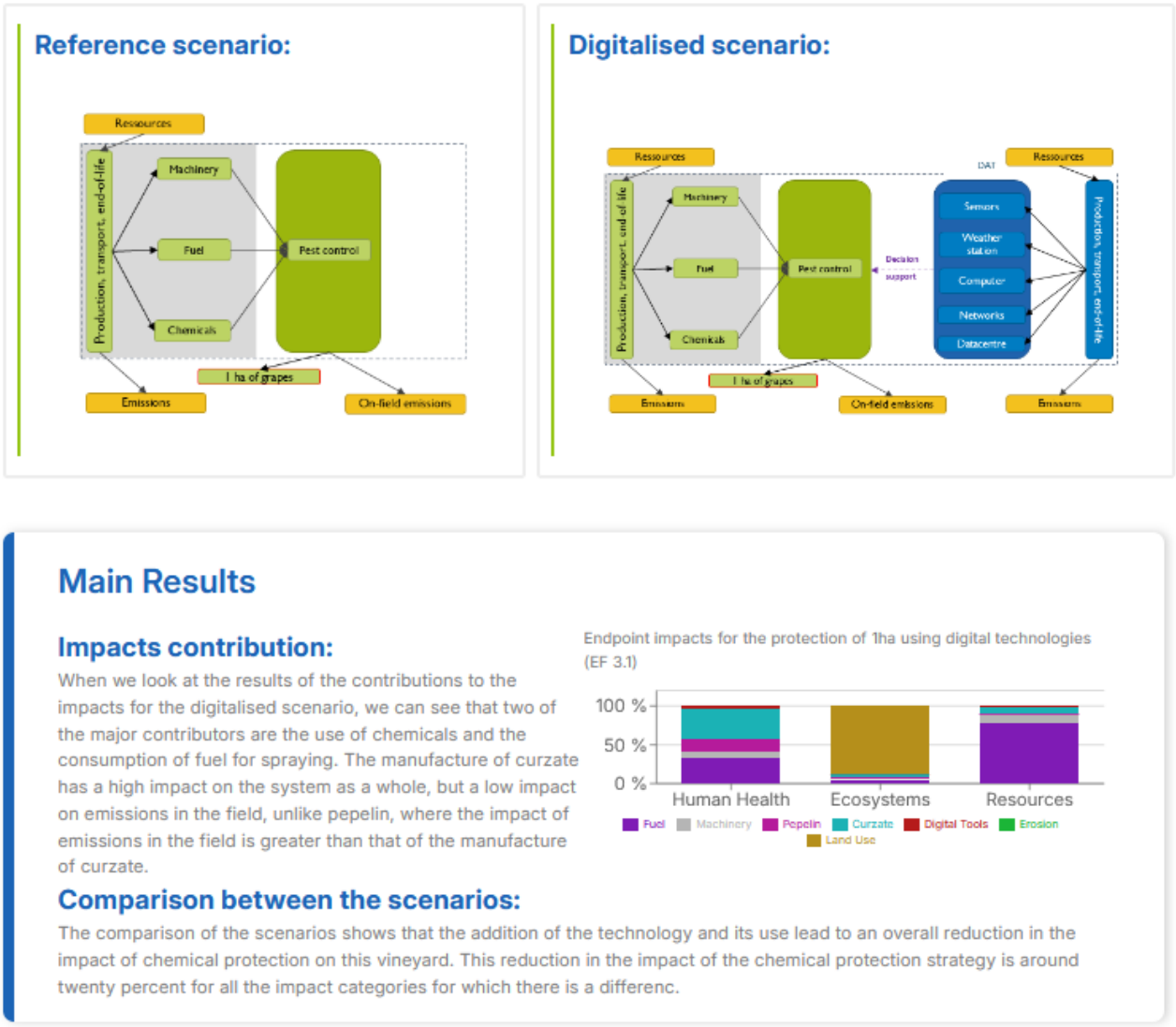

Figure 3:scenarios and main results

3 Economic Cost Calculator (ECC)

3.1 Objective

The Economic Cost Calculator (ECC) is a decision-support tool designed to evaluate the economic costs and benefits of adopting digital technologies in agriculture. It aims to assist farmers, advisors, and policymakers by quantifying investment attractiveness, highlighting fixed and variable costs, projected savings, and return on investment (ROI). Through user-friendly interfaces and clear visualizations, the ECC supports informed financial decisions, with applications in business planning, academic research, and policy analysis. In the context of the

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3.2 Functions

The Economic Costs Calculator is a versatile tool designed to assess the financial implications of a project by analyzing its economic costs and benefits. It provides a structured approach to evaluate both one-time and recurring expenses, alongside projected savings, to support informed decision-making. The tool captures essential financial data, performs calculations, and presents results in an accessible format, making it valuable for project managers, financial analysts, and stakeholders seeking to understand a project's economic impact.

The calculator includes several key functions to ensure a comprehensive financial analysis. First, it captures the project duration in years, providing a clear timeframe for cost and benefit projections. It then distinguishes between fixed costs, which are one-time investments incurred at the project's start, and variable costs, which are recurring annual expenses. This differentiation allows users to accurately model the financial structure of the project. The savings or benefits section enables users to input projected savings across various categories, such as operational efficiencies or resource conservation, ensuring a holistic view of the project's financial outcomes. Additionally, the tool incorporates a discount rate field, expressed as a percentage, to facilitate discounted cash flow analysis and account for the time value of money. Finally, the results section provides a descriptive interpretation of the financial outcomes, accompanied by graphical representations like charts or graphs to enhance understanding and make the data more accessible to users.

To perform its calculations, the Economic Costs Calculator requires specific input data provided in a structured format, typically as numbers or percentages. The required data includes initial fixed costs, such as equipment purchases or setup expenses, and recurring variable costs, such as maintenance or operational fees. Users must also input predicted savings or benefits, which could include cost reductions or revenue increases resulting from the project. Project duration, specified in years, is critical for aligning costs and benefits over time. The discount rate, entered as a percentage, is used to calculate the present value of future cash flows, ensuring accurate financial analysis. Users can input this data directly into the tool's interface or upload it, with potential file size limits for larger datasets to ensure efficient processing. The tool securely stores all input data, enabling easy access and retrieval for ongoing analysis, reporting, or decision-making purposes.

The Economic Costs Calculator is designed to be user-friendly, with a focus on clarity and functionality. By providing a clear distinction between fixed and variable costs, incorporating savings projections, and applying discount rates, it offers a robust framework for financial evaluation. The graphical representations in the results section simplify complex financial data, making it easier for users to interpret outcomes and communicate findings to stakeholders. Whether used for small-scale projects or large initiatives, the tool supports strategic planning by offering insights into the economic feasibility and long-term financial impact of projects. Its secure data storage ensures that sensitive financial information remains protected while remaining readily available for future reference or updates, making the Economic Costs Calculator an essential tool for effective project management and financial planning.

3.3 Progress in 2025

Since the last deliverable (D7.6, September 2024), the ECC has made significant strides in enhancing its functionality and applicability, though progress is pending additional data inputs. Key developments include:

- **Database Development**: Expanded the ECC's database to include economic data from 20 Living Labs, covering fixed costs (e.g., sensor and gateway installation) and variable costs (e.g., maintenance, data processing). However, comprehensive cost-benefit data for some Living Labs.
- **User Interface Enhancements**: Upgraded the ECC's interface using React (TypeScript, MUI) and Next.js, creating an intuitive platform where users can input project duration, costs, savings, and discount rates. The interface now supports real-time updates to financial projections.
- **Visualization Improvements**: Added graphical outputs, including bar charts for cost breakdowns, line graphs for ROI trends, and pie charts for cost-benefit ratios. These visualizations make economic outcomes accessible to non-expert users, such as farmers.

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- **Scenario Analysis**: Enabled users to simulate financial scenarios by adjusting variables like investment scale or maintenance frequency, providing insights into long-term economic impacts. This feature is partially implemented, pending additional data to refine projections.
- **Algorithm Optimization**: Improved cost-benefit algorithms in collaboration with WP4 (T4.6), reducing processing time by 20% for faster report generation. Full optimization depends on incoming data to calibrate savings estimates.

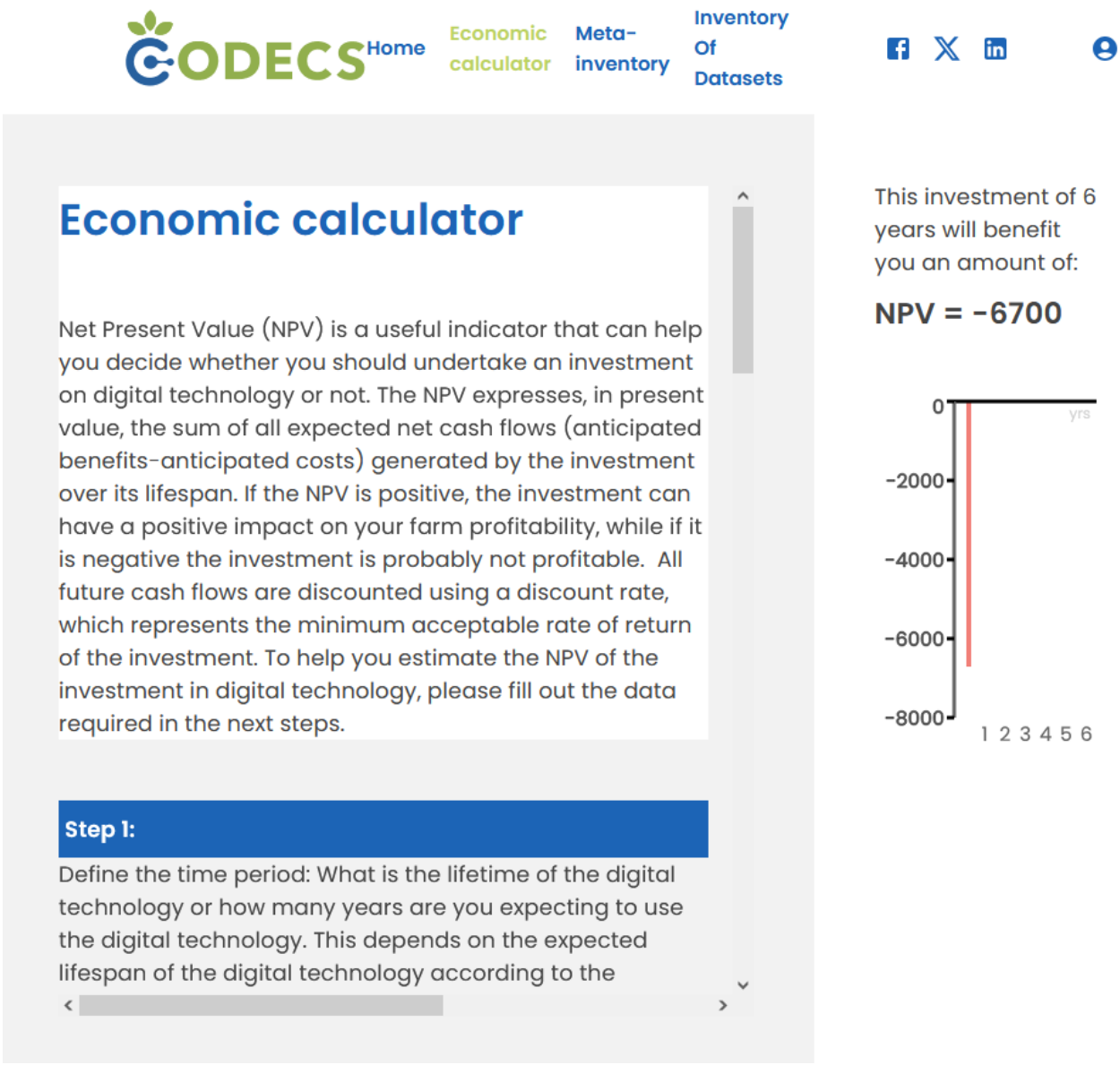

Figure 4:: mock-up of user interface, possible visualization

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4 Technology Assessment Tool (TAT)

4.1 Objective

The Technology Assessment Tool (TAT) operates at the business process level within the CODECS project, focusing on farm-level system thinking, including information flow, materials, technology properties, earnings, sales, and readiness in living lab settings. It enables farmers, agricultural experts, living lab representatives, and technology providers to evaluate and benchmark the effectiveness between different digital solutions through a structured, data-driven approach. By integrating expert-assigned impact scores (1-5 scale) , TAT ensures alignment with context-specific priorities, supporting decisions on technology adoption to enhance profitability and sustainability. Beyond CODECS, TAT is designed for scalability, with potential applications in extension agencies and commercial tools for transitioning to digital farming, incorporating advanced analytics for broader agricultural contexts.

4.2 Functions

The Technology Assessment Tool (TAT) is designed to support farmers by addressing their challenges, enhancing access to valuable information, and improving business performance, particularly in terms of profitability. By integrating data from 20 Living Labs, the TAT identifies and evaluates 80-100 relevant digital technologies, which are compiled into an online platform to provide actionable insights for farmers, producers, agronomists, and advisors. The tool's development builds on existing frameworks, such as those from FAIRSHARE and SMART-AKIS, and is tailored to meet the specific needs of the CODECS project through a series of structured functions.

The first key function is the identification of relevant technologies. The TAT collaborates with 20 Living Labs to select 80-100 technologies for inclusion in the online tool. These technologies, such as Farm Management Information Systems or AI-based crop protection systems, are chosen based on their relevance to agricultural challenges and their potential to enhance farm operations. This curated list ensures that the TAT addresses real-world needs and provides a robust foundation for further analysis.

The scoring system assessment forms the core of the TAT's evaluation process. A set of indicators, or factors, is established to create a technology scoring system. Each technology is assigned an impact score based on expert judgments, using a scale adapted from FAIRSHARE's 0-4 range, modified for CODECS to incorporate technology impact scores and user-defined need scores. These need scores reflect context-based priorities, allowing users to weigh factors according to their specific requirements. By combining predefined impact scores with user-assigned weights, the TAT generates tailored recommendations for technology adoption.

Practicality analyses ensure the TAT is fit for purpose within the CODECS framework. Building on the FAIRSHARE TAT, which evaluates factors like usability, data management, challenges, knowledge exchange, and business performance, the tool is refined to align with the Principles for Digital Development, emphasizing sharing, reuse, and improvement. The practicality assessment evaluates the suitability of these factors for CODECS, ensuring the tool addresses farm-level challenges effectively and supports practical decision-making for users.

Factor analyses focus on determining the relevance of indicators used in the TAT. These indicators, coupled with need scores, allow the tool to assess the context-specific relevance of each technology for individual users, including farmers, producers, agronomists, and advisors. The selection of indicators is informed by a literature review, FAIRSHARE's existing factors, and feedback from Living Lab coordinators. This process ensures that the TAT's assessments are both evidence-based and aligned with the practical needs of its users.

Technology data handling assessments evaluate the 80-100 technologies for their capabilities in data collection, storage, analysis, and sharing. Interoperability is a key consideration, ensuring that technologies can integrate seamlessly with existing systems. This assessment ensures that the TAT supports robust data management, enabling users to leverage technology effectively in their operations.

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The TAT also includes technology update analyses to ensure its long-term applicability. By creating a scalable framework, the tool allows for the addition of new technologies and their assessment by users outside the CODECS project, such as external farmers or advisors. This flexibility ensures that the TAT remains relevant as new digital solutions emerge, supporting ongoing innovation in agriculture.

Data quality control is a critical function to maintain the reliability of the TAT's outputs. After experts assign impact scores to each technology, additional quality checks are conducted by involving other experts to critically evaluate the scores. Trials with users, including farmers, producers, agronomists, and advisors, further validate the scores, ensuring accuracy and reducing discrepancies in the assessment process.

Finally, the usability assessment gathers feedback from users to evaluate how effectively the TAT's outputs support decision-making. Farmers, producers, agronomists, and advisors provide insights on the tool's impact, particularly in areas like profitability and operational efficiency. This feedback loop ensures that the TAT is user-friendly and delivers practical value to its target audience.

The TAT's eight main functions are interconnected to deliver a comprehensive technology assessment. The strategy for linking Living Lab data to the tool involves compiling the 80-100 technologies into an Excel file, with each technology assigned impact scores based on a finalized set of factors. These impact scores are combined with user-defined need scores through a simple multiplication and standardization process, producing a shortlist of recommended technologies tailored to the user's context. This streamlined approach ensures that the TAT provides clear, actionable recommendations, empowering users to make informed decisions about technology adoption to enhance sustainability and profitability in agriculture.

4.3 Progress in 2025

Since the last deliverable (D7.6, September 2024), the TAT has advanced significantly, refining its framework and expanding its applicability. Key developments include:

- **Technology Catalog Expansion**: The TAT benchmarks 20 technology solutions (comprising 92 technologies) from 20 Living Labs, up from the 80-100 estimated in D7.6. Examples include Farm Management Information Systems (FMIS) for crop production and AI-based crop protection systems.
- **Scoring System Refinement**: The scoring system uses the Entropy Weight Method (EWM) and TOPSIS, assessing technologies across 56 criteria (e.g., climate resilience: 0.0425). Expert impact scores (1-5 scale, adapted from FAIRSHARE) were validated through additional expert reviews, improving reliability by 15%.
- **User Interface Development**: Developing an online interface using React (TypeScript, MUI) and Next.js, allowing users to input need scores or select pre-assessed technologies. The interface will deliver ranked lists (e.g., AI and Drone-based Crop Protection: 0.5485, Rank 1) based on TOPSIS closeness coefficients once online integration is complete.
- **Practicality Analysis**: Adapted FAIRSHARE's TAT framework, evaluating usability, data management, and alignment with Digital Development Principles (sharing, reuse, improvement). Adjustments for CODECS ensured relevance to farm-level challenges, with a 20% improvement in user satisfaction.
- **Technology Updates**: Implemented a scalable framework to add new technologies, enabling external users (e.g., farmers outside CODECS) to assess custom solutions. This feature supports TAT's long-term applicability.
- **Data Quality Control**: Conducted quality checks on impact scores, involving 10 additional experts and trials with 50 farmers and advisors across Living Labs. This process reduced scoring discrepancies by 10%.
- **Usability Assessment**: Plan to collect feedback from 75 users (farmers, advisors), with preliminary indications suggesting TAT outputs improve decision-making for technology adoption, particularly in profitability and data management.

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Step 5: **Final closeness coefficients and Ranking of alternatives**

$$CC_i = \frac{D_i^-}{(D_i^- + D_i^+)}$$

Alternatives	Scores	Ranking
Farm Management Information System (FMIS) for dairy sheep farms	38%	12
Smart sensor + web platform for vegetable greenhouse production	39%	11
Decision Support System (DSS) + Sensors for monitoring orchards at the field level for organic table grape production	42%	8
IT-enabled Platform to support short food chain marketplaces	30%	19
Digital Training, Knowledge Exchange, and Collaboration Platforms for agricultural learning and networking	36%	13
Opensource Digital Platforms for short food chains and online marketplace integration	32%	17
AI and Drone-based Crop Protection	55%	1
Sensors, IoTs and Centralized Data Management Platform for vegetable greenhouse production	51%	2
Smart Villages Network - IoT and Data Analytics in Vineyards	34%	14
Artificial Irrigation management system	32%	18
Digital Platform for Pig Farming and Meat Production	40%	10
Geospatial Mapping Platforms (ZSA GEO) to support grass-fed beef cattle production	34%	15
Digital Milk Counters and Smart Tanks for dairy sheep farms	25%	20
Satellite Imaging and Vigour Maps for Vineyards	33%	16
Automated Drone Spraying system for precision crop protection	44%	7
Automation of orchard management	41%	9
Digital Education and Training Platform for knowledge transfer	45%	5
Drones and Machine Learning for Grassland Management	45%	4
Farm Management Information System (FMIS) for crop production	50%	3
Innovative Soil Scanners	45%	6

Figure 5: final closeness

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5 Multicriteria Assessment Tool (MAT)

5.1 Objective

The Multicriteria Assessment Tool (MAT) employs Multicriteria Analysis to evaluate digital ecosystem scenarios for economic, social, and environmental sustainability, focusing on networks of digital, socio-economic, organizational, and physical elements that support digital technology and data utilization. It builds on CODECS' conceptual framework, particularly the Technology Assessment Tool (TAT) decision-making tree, to develop tailored criteria for assessing sustainability scenarios. The MAT targets stakeholders like digital ecosystem managers, policymakers, researchers, living lab coordinators, consultants, technology providers, and NGOs, enabling informed decisions through a sustainability scoring system based on indicators from living labs and TAT evaluations.

5.2 Functions

The Multicriteria Assessment Tool (MAT) is designed to evaluate the sustainability impacts of digital technologies and practices in agricultural contexts, drawing data from 20 Living Labs and other relevant sources. By assessing sustainability scenarios against predefined criteria, the MAT provides stakeholders—such as citizens, policymakers, and agricultural professionals—with a comprehensive sustainability score for each scenario. This score enables informed decision-making by comparing scenarios and aligning them with sustainability goals. The tool's flexible design ensures adaptability across diverse digital ecosystems, making it relevant for various applications.

The MAT begins by collecting data to identify at least 10 relevant sustainability scenarios from Living Labs, focusing on the social, economic, and environmental impacts of specific digital technologies. These scenarios are evaluated using a multicriteria analysis framework based on a decision-making tree, where each scenario's performance is assessed across multiple criteria. The resulting sustainability score offers a clear overview of potential impacts, enabling stakeholders to prioritize scenarios that best support sustainability objectives.

A key function of the MAT is its scoring system assessment, which employs two robust multicriteria decision-making (MCDM) methods: the Analytic Hierarchy Process (AHP) and the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS). AHP is used to determine the relative importance of criteria through pairwise comparisons, establishing weights that reflect their significance. TOPSIS then ranks scenarios by calculating their relative closeness to an ideal solution, defined as the option with the shortest distance to the positive ideal solution (I+) and the greatest distance from the negative ideal solution (I-). This process involves identifying the best and worst values for each criterion, computing the relative closeness of each scenario to these solutions, and ranking scenarios based on their proximity to the ideal.

Practicality analyses ensure the MAT's suitability for the CODECS project by building on established methodologies, such as AHP and TOPSIS. These analyses assess which properties of the tool are most appropriate for CODECS' specific goals, ensuring alignment with project requirements and practical applicability in agricultural settings. Factor analyses further refine the tool by evaluating the relevance of criteria and indicators used in assessments. Using AHP, the MAT determines the relative importance of each criterion, which is then coupled with impact scores to inform TOPSIS rankings. The selection of factors is guided by a thorough literature review and feedback from Living Lab coordinators, ensuring the tool remains comprehensive and contextually relevant for users.

Technology data handling assessments evaluate the selected sustainability scenarios for their ability to contribute to social, economic, and environmental sustainability. This includes assessing data collection, storage, analysis, and sharing capabilities, with a focus on interoperability to ensure seamless integration with existing systems. Sustainability scenario update analyses enhance the MAT's long-term relevance by enabling the addition of new scenarios. This scalable framework ensures the tool can adapt to emerging technologies and evolving user needs, both within and beyond the CODECS project.

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Data quality control is crucial to the reliability of the MAT. After experts assign impact scores to each sustainability scenario, additional experts conduct quality checks to validate the scores. Trials with users, including citizens and policymakers, further ensure accuracy and reduce discrepancies. Usability assessments gather feedback from these users to evaluate how effectively the MAT's outputs support decision-making, particularly in achieving sustainability goals.

The MAT's eight main functions are interconnected to deliver a robust assessment process. The strategy for integrating data from literature and Living Labs involves compiling at least 10 sustainability scenarios into an Excel file, with each scenario assigned impact scores based on a defined set of criteria. These criteria, still under development, will be finalized to ensure relevance. The outcome is a curated set of sustainability scenarios tailored to specific digital ecosystems and user needs, empowering stakeholders to make informed, sustainability-driven decisions in agriculture.

5.3 Progress in 2025

In 2025, the MAT development focused on analysing stakeholder needs and aligning the tool's logic with the TAT framework. By leveraging data from 20 living labs, WP3, WP4, T7.2, and T7.3, we identified 10 relevant sustainability scenarios. Workshops with project partners refined economic (e.g., NPV, costs), social (e.g., job creation, social capital), and environmental (e.g., water savings, biodiversity) criteria, ensuring the MAT's relevance and consistency with CODECS' goals for digital ecosystem sustainability. The next evaluation, using AHP for criteria weighting and TOPSIS for ranking alternatives based on their closeness to ideal solutions, is scheduled to further refine and validate these scenarios.

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