



OPTAIN

Optimal Strategies to Retain Water and Nutrients

D7.4: Learning Environment development strategy

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Project Consortium



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Summary

Deliverable D7.4 *OPTAIN Learning Environment development strategy* is related to task 7.2 *Learning Environment and website* of WP7 *Communication, dissemination and Learning Environment*.

The **Learning Environment (LE)** is an online platform that is being developed to help building capacity and disseminate OPTAIN methodologies and results and to convey the knowledge co-created by OPTAIN consortium towards NSWRM stakeholders and beyond. Table a provides a first insight of the LE and its characteristics and potential functions as an online platform by using key words highlighted by the project partners.

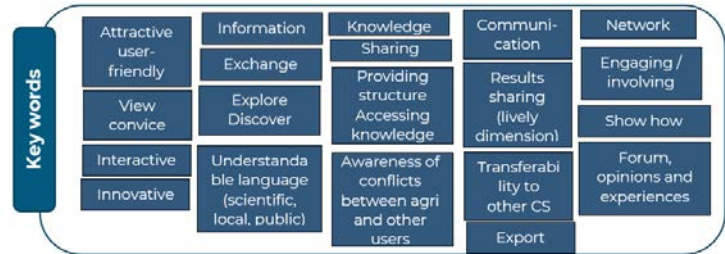


Table a: Partners key words to describe OPTAIN LE

The strategy development for the LE is an iterative process that has started at the beginning of the project (September 2020). Two updates of the strategy are planned over the course of the project.

The first version of deliverable D7.4 was released at month 12 (August 2021). It corresponds to PART 1¹ of the deliverable. Among other things on the method, targeted audiences, planning, etc., it presents the consolidated vision of the LE. The vision was based on the foreseen LE described in the Description of Activities and the expectations of the partners gathered via interviews (Table b). As a result, the frame of the LE was designed (Figure a).

Table b: Partners expected objectives of the LE

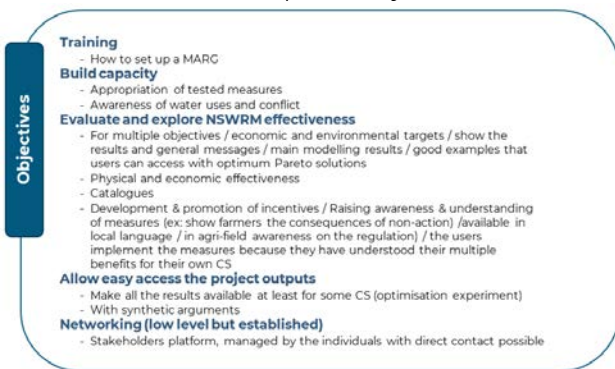
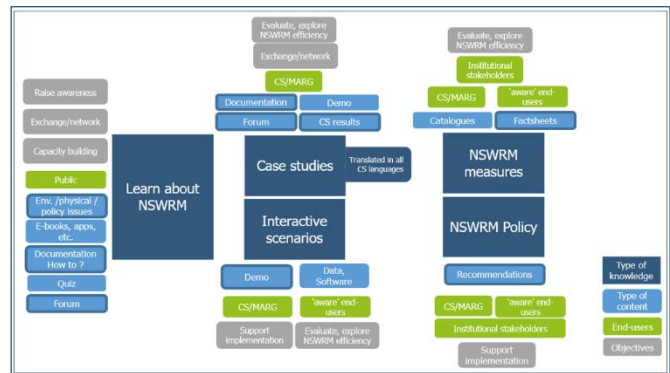


Figure a: OPTAIN LE first frame



The first update of the deliverable D7.4 was submitted in October 2023. It corresponds to PART 2 of this document. The starting point of the first update is the LE frame (Figure a), which guided the development of the first mock-up (Figure b) and then the

¹ Part 1 has been reviewed and validated by the European Commission during the review of RPI that took place in May 2022.

development the first on-line version (Figure c). The overall development benefited from regular exchanges with the partners, case studies stakeholders through the MARG as well as with external stakeholders through interviews made for deliverable D7.5² to set OPTAIN training analysis.

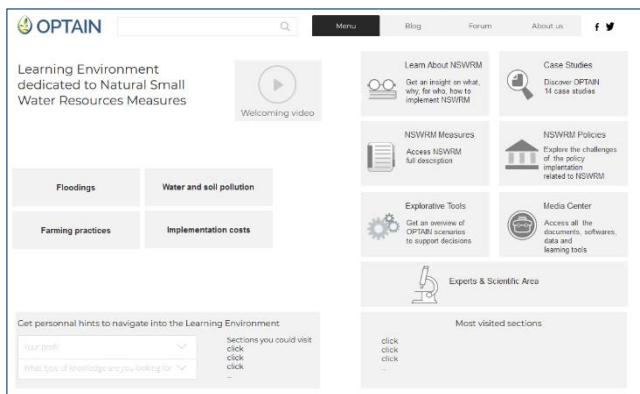


Figure b: OPTAIN LE first mock-up



Figure c: OPTAIN LE first online version

PART 2 first highlights the conceptual development of the LE, which took place from August 2021 to October 2023. It then focusses on the technical development, which ended up on the first online version, presented during the OPTAIN Summer School (Prague, Czech Republic, July 2023) and the OPTAIN General Assembly (Iseo, Italy, September 2023). PART 2 also recalls the key discussions on the indicators used by the CS leaders to describe their NSWORMs.

OPTAIN Learning Environment on-line version #1 is available at
<https://optainle.dev.oieau.fr>
 Contact p.lanceleur@oieau.fr for the identification and password

The second update of the deliverable D7.4 was submitted in February 2025 (this report). It contains key refinements to enhance usability, navigation, and partner feedback. Structured progress updates have been introduced under each section of PART 2 to track specific improvements and milestones:

- **Interactive mapping and visualisation tools**, improving user interaction.
- **Structured knowledge pathways**, tailoring content for different stakeholders.
- **Enhanced case study integration**, ensuring that case studies are incorporated.
- **Optimised menu navigation**, refining content access and usability.
- **Expanded language features**, enabling multilingual accessibility.
- **Advanced filtering and search functionalities**, facilitating content discovery.

The LE is now available with its final URL (<https://le.optain.eu/>). Although the content is not yet available for the public, all partners have been given a login and password so they can provide feedback. Each section now includes dedicated progress update boxes so

² D7.5 Training analysis - Identifying the needs and capacity of relevant target groups for tailoring the OPTAIN Learning Environment to their potential users' requirements (August 2022)

that progress can be tracked in a structured format. The final version of the LE is on track for completion by the end of 2025, with improvements continuing based on user feedback and testing. This continuous improvement process supports the long-term usability and sustainability of the platform and ensures its relevance beyond the project duration.

OPTAIN Learning Environment on-line version is available at
<https://le.optain.eu/>

Contact p.lanceleur@oieau.fr for the identification and password

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Related deliverables

OPTAIN D1.1 - Stakeholder mapping report (February 2021). The report notably delivers the types of stakeholders that should be addressed/ targeted during the different phases of the projects

OPTAIN D1.2 - MARG Workshop report (February 2021).

OPTAIN D7.2 - Communication Dissemination Strategy (April 2021). The report notably highlights the target audiences in terms of communication and dissemination activities.

OPTAIN D7.3 - Minutes of training event for project partners on knowledge transfer and dissemination (June 2021). The report presents the outcomes of the two WP7 workshops partly dealing with the LE development strategy.

OPTAIN D7.5 - Training analysis - Identifying the needs and capacity of relevant target groups for tailoring the OPTAIN Learning Environment to their potential users' requirements (August 2022)

Abbreviations

API	Application Program Interface. A set of URL that can navigate remotely a website, and get or update its data
CS	Case Study
EPI	Environmental Performance Indicator
LE	Learning Environment
NSWRM	Natural/Small Water Retention Measures
OPTAINLE	OPTAIN Learning Environment
RPI	Reporting Period 1
SPI	Socio-economic Performance Indicator
SSO	Single Sign On
WP	Work Package

Glossary

Alfresco	Alfresco delivers innovative content management solutions., https://www.alfresco.com
Anonymous access	A user access that does not require any authentication (login).
API	Application Program Interface. A set of URL that can navigate remotely a website, and get or update its data.
Client-server mode	An application that works partially on a server and on the client.
Development website	A website that is not public and still under construction.
Doorway	A conceptual navigation entry point in the ePLANETe platform.
Drupal	Drupal is a free and open-source web content management system (CMS) written in PHP and distributed under the GNU General Public License.
End user	The user that experiments the website.
ePLANETe	Education and Research Knowledge Gateway for Sustainability, https://www.eplanete.blue
Essential cookies	Cookies (a key-value pair data) that are essential for the user experience. They are stored locally at the user browser side.
Gallery	A conceptual collection of objects in the ePLANETe platform.
iFrame	iFrame is the name given to an HTML tag used in computer programming to embed the content of another HTML page into an HTML page.
Open Data	«Open data is data that is openly accessible, exploitable, editable and shared by anyone for any purpose. Open data is licensed under an open license. », Wikipedia
Open Source	« Free and open-source software (FOSS) is a term used to refer to groups of software consisting of both free software and open-source software[a] where anyone is freely licensed to use, copy, study, and change the software in any way, and the source code is openly shared so that people are encouraged to voluntarily improve the design of the software. », Wikipedia.
OPTAINLE	Code name of the OPTAIN Learning Environment
Portal	A website that is mainly composed of other website content.
Production website	The public finalized version of the website.
RShiny or Shiny – Rstudio	Opensource R package that provides an elegant and powerful web framework, popular to represent scientific data, https://www.rstudio.com/products/shiny/

SSO	Single Sign On. Technic that requires one authentication only to many website access.
UX/UI	User eXperience (ergonomic design), User Interface (screen layout design)

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PART 1

Part 1 of the report presents the first version of the OPTAIN Learning Environment development strategy, delivered at month 12 (August 2021) and reviewed and validated by the European Commission during the review of RP1 (month 18).

Part 1 shows how the vision of the Learning Environment has been set by combining the foreseen Learning Environment proposed in the Grant Agreement and the expectations of the partners once the project had started.

It ends with the design of the Learning Environment, which was used from September 2021 to develop the first mock-up and then the first online version (described in part 2).

Introduction

OPTAIN covers the wide range of research and innovation activities from the technical and scientific developments to the dissemination of its results in terms of Natural/Small Water Retention Measures. While involving the first target of potential end-users of OPTAIN outcomes through the Cases Studies (CS) and MARG (Multi-Actor Reference Group), the OPTAIN Learning Environment (LE) will ensure an easy access to each category of knowledge related to NSWRM that will be developed and tested during the five years of the project taking in to account the pre-existing knowledge such as existing catalogues on NSWRM (WOCAT and NRW.M.eu).

The foreseen categories of knowledge of the LE are: (i) Learn about NSWRM, (ii) Case studies, (iii) Interactive scenarios, (iv) NSWRM measures and (v) NSWRM policy. Each of these categories will be composed of materials such as data, software and documents, which correspond to the type of content that will be displayed on the LE. The type of contents plays an important role to fulfil the objectives of the LE (i.e. evaluate and explore NSWRM effectiveness, training and building capacity). In addition, each of the 7 main objectives of the project are content wise for the LE. Table n°1 shows in a simplified manner which objective is related to which part of the LE. The seventh objective provides one specific aim of the LE related to the capacity building and disseminating the results of OPTAIN, which is widely applied not only to the LE but throughout WP7 activities (Dissemination, Communication and Learning Environment).

Table 1: OPTAIN main objectives and LE content

<i>OPTAIN main objectives</i>	<i>LE content</i>
<i>1. Analysing current and future climate-change-related conflicts in water and nutrient management for a representative set of multi-actor case studies at farm and catchment level, as well as disentangling region specific constraints and opportunities of past, present and novel NSWRM in agriculture and water management.</i>	Learn about NSWRM Case studies Interactive scenarios NSWRM policy
<i>2. Delivering an exhaustive catalogue of existing and further potentially relevant NSWRM and tailoring environmental and economic indicators for their (quantitative) assessment.</i>	NSWRM measures (factsheets & catalogues) Case studies
<i>3. Analysing ways of data collection to fulfil quantitative and qualitative input data needs of small catchment and farm-scale modelling and developing standardised guidelines for data compilation and storage, especially with respect to climate scenarios.</i>	Case studies
<i>4. Setting up, enhancing and applying models to evaluate the environmental and economic sustainability of NSWRM on the farm and catchment level using the comprehensive set of relevant indicators and a standardised, protocol-based modelling approach across all case studies.</i>	Data, software, documents Case studies
<i>5. Identifying most effective implementation schemes for NSWRM, including their combination and allocation and illustrating trade-offs and synergies among multiple objectives.</i>	NSWRM measures (factsheets & catalogues) Interactive scenarios Case studies
<i>6. Synthesizing project outcomes and formulating general and case study specific recommendations for actors and policy makers and drawing implications of these options for policy and practice.</i>	Case studies NSWRM policy
<i>7. Building capacity and disseminating the project results using a comprehensive training analysis, an interactive learning environment and a variety of communication formats.</i>	One specific aim of the LE

Deliverable D7.4 Learning Environment development strategy aims at setting the different phases of the LE development and related key issues to deliver by the end of the project the LE final version with a complete state of NSWRM knowledge combining OPTAIN results and existing knowledge.

Deliverable D7.4 will be issued three times, at month 12 (this version), month 36 and month 48. During the first year of the project, activities related to the LE have focussed on the establishment of the LE vision. The partners' understanding and expectations were gathered to ensure the development strategy is aligned with the main objectives set in the Description of Action. The three first guiding principles addressed to set the strategy were: Why developing the LE? For whom? What content? The following ones deals with the development of the LE it-self and follow the Agile approach. This second stage will start at the beginning of the second year (September 2021) of OPTAIN.

This report presents the method to develop the strategy (section 1) and the related overall approach that is based on an iterative, participatory and co-creation process. This allows for a learning process among partners and together with stakeholders and for a harmonized approach across all case studies. The vision is embedded in the analysis of the Description of Action (section 2) that presents a synthetic view of the objectives target audiences and content of the LE. It opens up to the partners' perception and understanding of what should be and delivered by the LE, which is presented in section 3. The fourth section deals with the strategy implementation from year 2 and focusses on the strategy plan for the forthcoming year and the draft design of the LE.

Although the LE will be accessible from the OPTAIN website, it will be a separate online platform. The aim is to succeed, over the time of the project, in embedding OPTAIN results within the NSWRM existing knowledge. OPTAIN LE aims at acting as user-friendly source of knowledge that can support stakeholders to understand the added value of NSWRM and provide evidence-based support for their implementation. In addition to the LE it-self, the training and building capacity dimensions will be triggered and also used to benefit from the stakeholders' engagement to adapt the LE and ensuring their needs are tackled. Different opportunities will be provided such as a summer school and regional workshops.

1. Method

This section aims at explaining the method used to set the Learning Environment (LE) development strategy. As explained in the introduction, the document will be updated twice while the first LE online version will be delivered at the end of the second year (August 2022). To make this possible, and to ensure that the LE tackles the objectives of the project and the stakeholders' needs and expectations, a key action of the method is to set a permanent cycle of engagement and collaboration with the potential end-users and the project's partners.

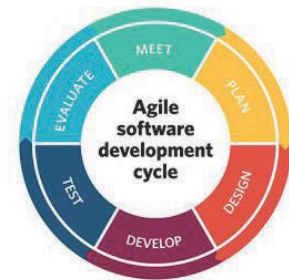
1.1. Overall approach: iterative, participatory and co-creation process

The LE development is embedded in an iterative process that has started with the project's partners since the beginning of OPTAIN and that will be carried out during the full duration of the project.

The iterative process relies on the participatory and co-creation approach. The process has started right at the beginning of OPTAIN so partners could share their understanding and address their expectations for the LE. The aim is to finally decide the key components of the LE.

The development process is inspired from the Agile software development principles, which places the end-users at the centre the development. It relies on permanent collaboration so the changes can be implemented rapidly. The key word for both the end-users and the developers is flexibility. Nevertheless, this requires a clear plan of activities (that can be adapted) all along the development of the LE.

Figure 1: Agile cycle



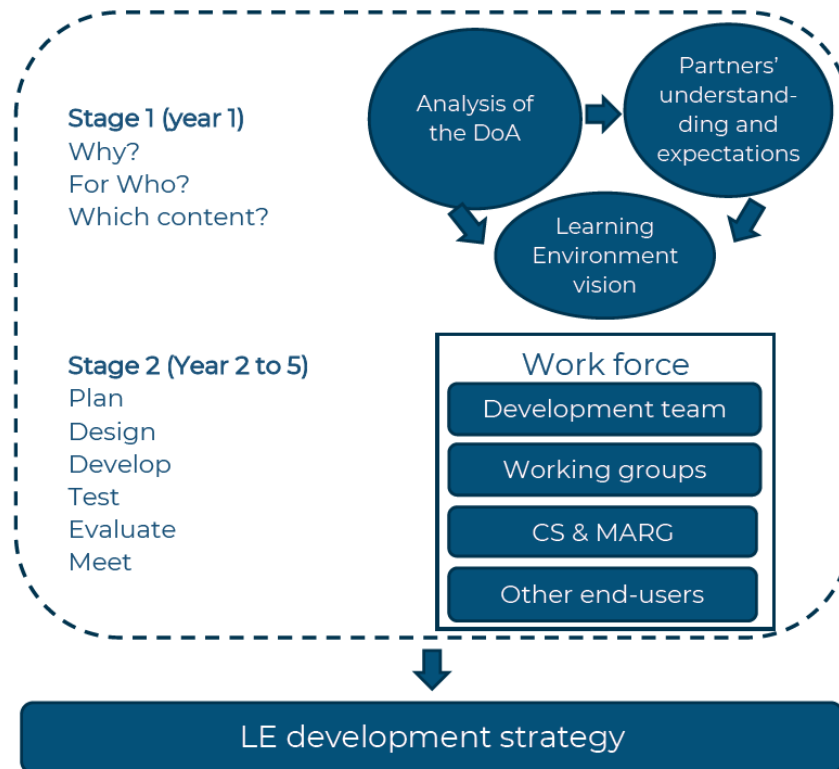
1.2. Guiding principles

The development of the LE is a process that will be carried out over the five years of the project. The guiding principles are based on two stages. The first one is dedicated to the establishment of a LE's shared vision among the partners. The second one focuses on the implementation phase of the strategy.

1.2.1. Setting the Learning Environment vision

The starting point is to set the vision of the LE. The vision is based on the preliminary elements described in the DoA¹ (objectives, content and synergies among the different activities of the project) and the project's partners understanding and expectations. The former has been analysed thanks to a desk analysis. The latter was done with presentations and discussion during meetings (i.e. OPTAIN kick-off, WP7 workshops) and a series of dedicated interviews. The desk analysis highlighted the key components of the LE that were presented to the partners.

Figure 2: Learning Environment development strategy - guiding principles



1.2.2. Following guiding principles

Through the desk analysis and interactions with the project's partners, the following guiding principles were followed and used as a grid of analysis. The first three represent the first stage of the LE development strategy:

- Why developing the OPTAIN LE? Setting the objectives of the LE is highly important as they will path the way to the categories of knowledge and related types of content of the LE, the engagement with the potential end-users and the related design of the LE.
- For whom? The multiple targets need to be clearly defined from the beginning as the content should be developed according to their profiles (i.e. NSWRM³ experts/non experts), and the design thought to propose different layers of knowledge.
- Which content? NSWRM³ are a vast domain crossing environmental, scientific, economic, social issues. Defining the content is crucial to decide what knowledge should be accessible for which type of end-users

The first three principles lead to the LE vision. The following ones are about the second stage and lead to the implementation of the strategy as the vision provides the key materials to:

- Plan the overall development of the LE from the beginning of the second year to the end of the project by identifying the key milestones along with the key challenges to be anticipated. The key delivery dates are provided in the DoA.

³ Natural/Small Water Retention Measures (NSWRMs)

Intermediary milestones will be planned for each period according to the objectives to be reached, both in terms of development and collaboration with the projects' partners and potential end-users. The vision draws the ideal final product. The challenges highlight the constraints that could prevent the LE development. In case of temporary blockage, a simple SWOT⁴ analysis will be done to identify the best available option to carry the LE development.

- Set the design of the LE. The design is both related to the structure of the LE and the path of knowledge. This refers to the organisation of the different layers of the knowledge (i.e. vernacular, technical, scientific) that will propose inductive choices to the different profiles of end-users.
- Launch the development phase that will be carried out until the end of the project.
- Test the different versions and updates of the LE from the IT development perspective.
- Evaluate the different versions and updates of the LE with regular feedbacks from the partners and potential end-users.
- Meet regularly with the different potential end-users.

The implementation of the second stage relies on a so-called work force that is composed of different groups of actors:

- The development team embraces the overall design and the IT development of the LE.
- The design is strongly related to the vision and to reach it Working Groups (WGs) will be set by type of content and composed of OPTAIN partners. The WGs will have a strong responsibility as they will ensure that the content of the LE reflects both the existing knowledge and the innovative one developed by OPTAIN. For example, this aspect is particularly important for the NSWRM catalogue that will be displayed on the LE and will be built from two existing catalogues (WOCAT and NWRM.eu). The dedicated WG will be in charge of deciding how the measures are presented and related to the existing catalogues.

The Case Studies (CS) and MARG stakeholders during year 2 and 3 plus potential end-users from year 4 will be involved in the evaluation process.

⁴ SWOT: Strengths, Weaknesses, Opportunities, Threats

1.3. General time frame

The starting point of the first year (2020-2021) was to compare the LE vision set in the DoA with the partners understanding and expectations in order to set the basis for the strategy (in terms of objectives, content, target audiences). The LE will gather many outputs from all WPs (see following section for the details). This leads to a key challenge: ensuring that the project's partners' understanding and expectations are well taken into account in the setting and development of different parts of the LE.

The objectives of the second year (2021-2022) is to deliver the first online version of the LE that will be composed of the 5 main categories of the knowledge set in the LE vision, each of them developed accordingly to the progress of the project and decisions made by the different dedicated working groups. The training effort will also be considered and further developed during the following years of their project when the content of the LE grows. A specific focus of the second year will be on the MARG CS stakeholders in order to gather their needs and engage through the MARG mechanism so they can share their feedbacks while the LE design and content are developed to be released online in August 2022. The technical development of the structure of the LE will be led by OiEau. Working groups dedicated to each part of the LE will support the content development

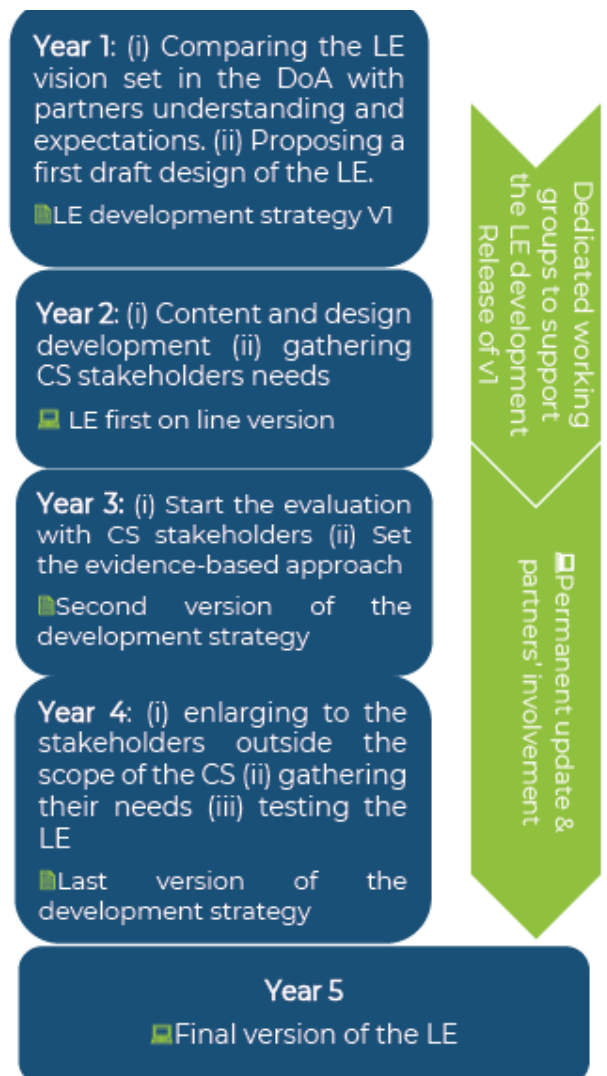
During Years 3 (2021-2023), the proper test of the LE will start with the CS stakeholders to provide the evidence based feedbacks to enlarge the use of the LE to the targets outside the CS.

During Year 4, stakeholders and potentials end-users outside the scope of the CS will be invited to join the process.

During the last year of the project, the LE will integrate stakeholders' feedbacks, its design and content will be finalized.

This time frame provides the key steps in terms of engagement with potential end-users but are not strictly set but are indicative. Some of them can start earlier. The golden goal of the development strategy is to deliver a useful and user-friendly LE so that the outcomes of OPTAIN are well promoted and stakeholders are supported in their decision to implement NSWRM.

Figure 3: Time frame of the LE development strategy



2. OPTAIN Learning Environment from the Description of Action

This section refers to the elaboration of the LE vision (see figure 2). It focuses on the elements provided by the DoA to gather the objectives, the content. The targets of the LE are described from the DoA and the preliminary work of WP1⁵ and WP7⁶. The synthetic view of these elements was used to engage with the project's partners, which is presented in section 3 annex 4.

2.1. The objectives

As stated in the DoA, OPTAIN LE will be the project's main dissemination and important co-creation product highlighting all major improvements in the knowledge on NSWRM from a scientific but also actors' perspective. It will be an information system accessible at the OPTAIN website and maintained for at least 5 years after the end of the project. While benefiting on new knowledge developed by OPTAIN, the LE does not aim to reinvent the wheel but to build from existing knowledge by integrating information and links towards acknowledged platforms such as WOCAT and NWRM.eu.

As such the LE will disseminate knowledge to a wide audience enabling all interested users to interactively study effects of NSWRM in the case study catchment. The LE will provide training to support decision-makers and land users' capacity to perform their own analysis on trade-offs and synergies related to NSWRM in the case study regions.

2.2. Categories of knowledge and types of content

The LE has been thought to gather and present all the new NSWRM knowledge developed by OPTAIN displayed in at least four main categories of knowledge:

- 1) **A concise documentation** of single, especially underutilised NSWRM relevant for the Continental, Boreal and Pannonian regions structured by the type of measure and their perceived (qualitative) as well as modelled (quantitative) environmental and socio-economic performance under different site and weather conditions. Each measure will be linked to two of the most important information systems on sustainable land management measures worldwide, NWRM.eu and WOCAT, which themselves will be updated and extended through the knowledge gained in OPTAIN.
- 2) **Interactive tools to study the effects of scale, location and combination of NSWRM.** In particular, those tools will utilise the Pareto-optimal solutions obtained for each case study and enable users to (1) navigate through the solutions' multi-dimensional (environmental and socio-economic) performance space, (2) filter their decision space regarding types of measures, their combinations and location/site characteristics of implementation within a catchment (e.g. on which soils, slopes,

⁵ OPTAIN D1.1 - Stakeholder mapping report (February 2021). The report notably delivers the types of stakeholders that should be addressed/ targeted during the different phases of the projects; OPTAIN D1.2 - MARG Workshop report (February 2021)

⁶ OPTAIN D7.3 - Minutes of training event for project partners on knowledge transfer and dissemination (June 2021). The report presents the outcomes of the two WP7 workshops partly dealing with the LE development strategy.

topographic position along the stream network), and (3) visualise their spatially explicit implementation in illustrative maps. Figures illustrating generic patterns and relationships among the Pareto-optimal solutions as discovered by machine learning tools will further help to study trade-offs and win-win situations of a spatially targeted and combined NSWRM implementation. Finally, the solutions selected/preferred by the local actors of each case study through a systematic MultiCriteria Decision Analysis will be presented in more detail (including e.g. practical advice for their implementation).

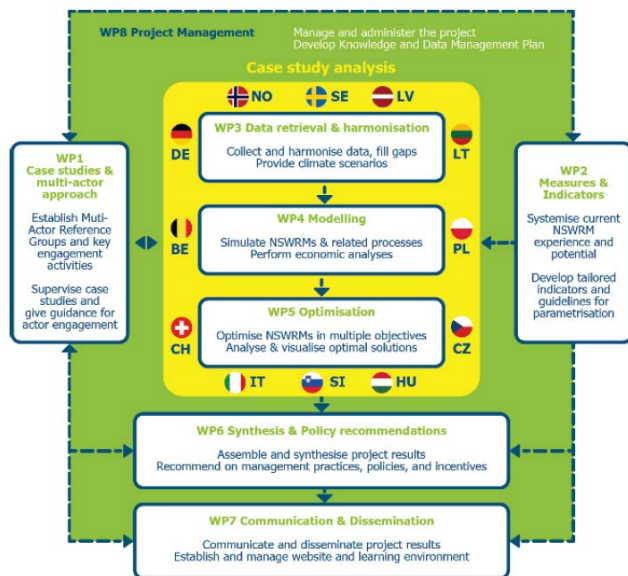
- 3) **Recommendations** for a better harmonisation of agricultural and water-related policies and more efficient and targeted incentives based on the case study results and additional cross-sectoral policy surveys.
- 4) **All best-practice guidelines, protocols and data processing scripts** that will be prepared for a harmonised and consistent project work across each case studies along with a set of training tools (e.g. webinars), enabling interested users (mainly researchers) to adopt and apply the methods developed and used in OPTAIN for their own project/research (e.g. standards for setting up, calibrating and combining process based models for NSWRM evaluation at the field and catchment scale, manuals how to conduct a spatially explicit multi-objective optimisation of NSWRM or land use/management in general).

In addition to these four main categories of knowledge, specific types of content have already been identified. Data, software and documents will provide the materials to each of these categories of knowledge. Beyond providing the content of knowledge, dedicated ones will support OPTAIN's main objective number 7 (see table 1) of the DoA in terms of building capacity and training for potential end-users to get familiar with the LE. In addition, a wide range of specific actions will complete the online support for training. For example, the training analysis at month 20 (April 2022), a summer school at month 30 (February 2023) and three regional workshops completed by month 50 (October 2024). Those events will provide the opportunity to engage with stakeholders. The LE itself will also allow to better understand the NSWRM (with the dedicated part on Learning about NSWRM) and explore NSWRM's potential implementation with the explorative scenarios.

2.3. From the Work Packages' perspective

The Learning Environment content is related to the outputs of the Work packages (WP), which will provide the content and materials to the four main blocks of knowledge

Figure 4: OPTAIN work package structure



mentioned above. For example, the WP1 Multi-Actors Reference Groups and stakeholders involved in the Case studies are the first target the LE will start with and consider. The stakeholders will be both potential users and be engaged in the LE development. WP2 focussing on NSWRM catalogue will provide access to the knowledge on the measures from an evidence-based perspective thanks to the CS and pre-existing catalogues (WOCAT and nwrms.eu). NSWRM's multi-objective optimisation and related interactive visualisation techniques developed within WP5 will be a central input for the Learning Environment. Among other things, WP6 analysis on policy and governance.

arrangements and the development of legislative recommendations for future harmonisation of water and agricultural policy on local, regional, national and EU level will feed the LE.

2.4. The main targets of the Learning Environment

To identify the target audiences of the LE, three main perspectives area considered: (i) the DoA, (ii) the CS' stakeholders mapping and (iii) OPTAIN C&D strategy⁷.

In its preliminary C&D strategy, the DoA describes three groups of target audiences and highlight which part of the LE could be of interest for them. The considered stakeholders (decision influencers, end users /affected communities and general public) are listed in the figure 5. After a year, this classification is still relevant. As it will be shown in section 3, the partners have highlighted similar groups of targets during the LE strategy development workshops and interviews.

First target audience

The first target audience considered for the LE development are the stakeholders involved in the 14 cases studies of the project, which benefit from the MARG. WP1 has delivered a Stakeholder mapping report⁸ highlighting the types of stakeholders to be engaged during the different phases of the project including the LE. The proposed classification is composed of eight profiles of stakeholders (see table 1) and has been done from the analysis of the 294 stakeholders identified as relevant members in the

⁷ See Related deliverables p7

⁸ Van den Brink, C., De Vries, A., Nesheim, I., Enge, C. (2021): Stakeholder mapping report, covering the case studies. Deliverable D1.1 EU Horizon 2020 OPTAIN Project, Grant agreement No. 862756

respective CS MARGs. The particularity of those stakeholders is that they are involved in the development of the LE. Thanks to the MARGs mechanism, stakeholders will be informed and their feedbacks gathered along the different development phases of the LE.

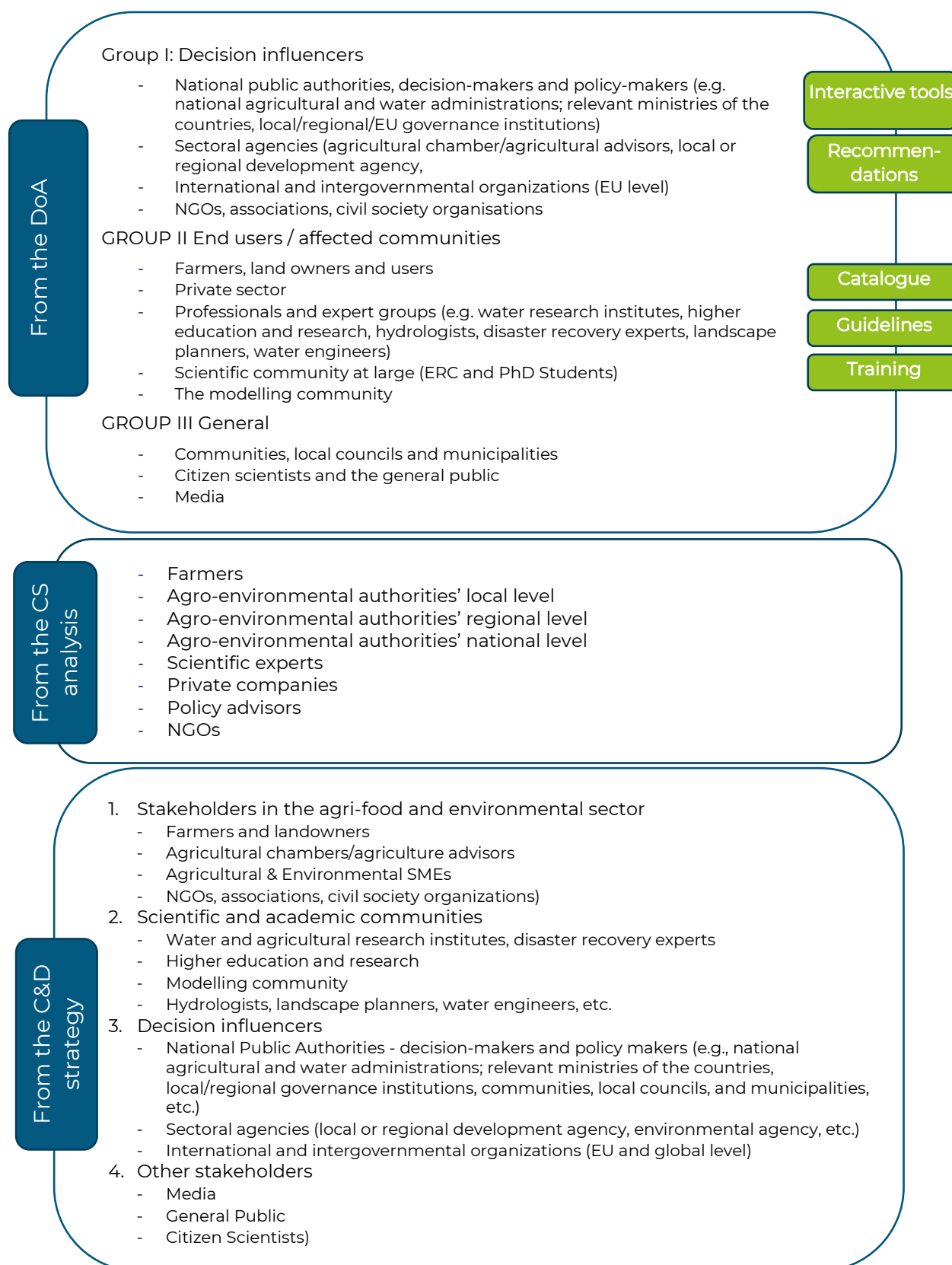
Second target

OPTAIN aims to provide evidence-based solutions from the CS development and then envisage their up-take towards stakeholders that are not involved in the CS. The latter represents the second target of the LE.

In April 2021, OPTAIN delivered its Communication and Dissemination strategy⁹, which highlights the stakeholders that should be targeted to promote OPTAIN solutions and engage with to ensure the LE dissemination.

⁹ Sabina, B. & Jergus, S. (2021): Communication and Dissemination Strategy. Deliverable D7.2 EU Horizon 2020 OPTAIN Project, Grant agreement No. 862756

Figure 5: The different targets of the Learning Environment



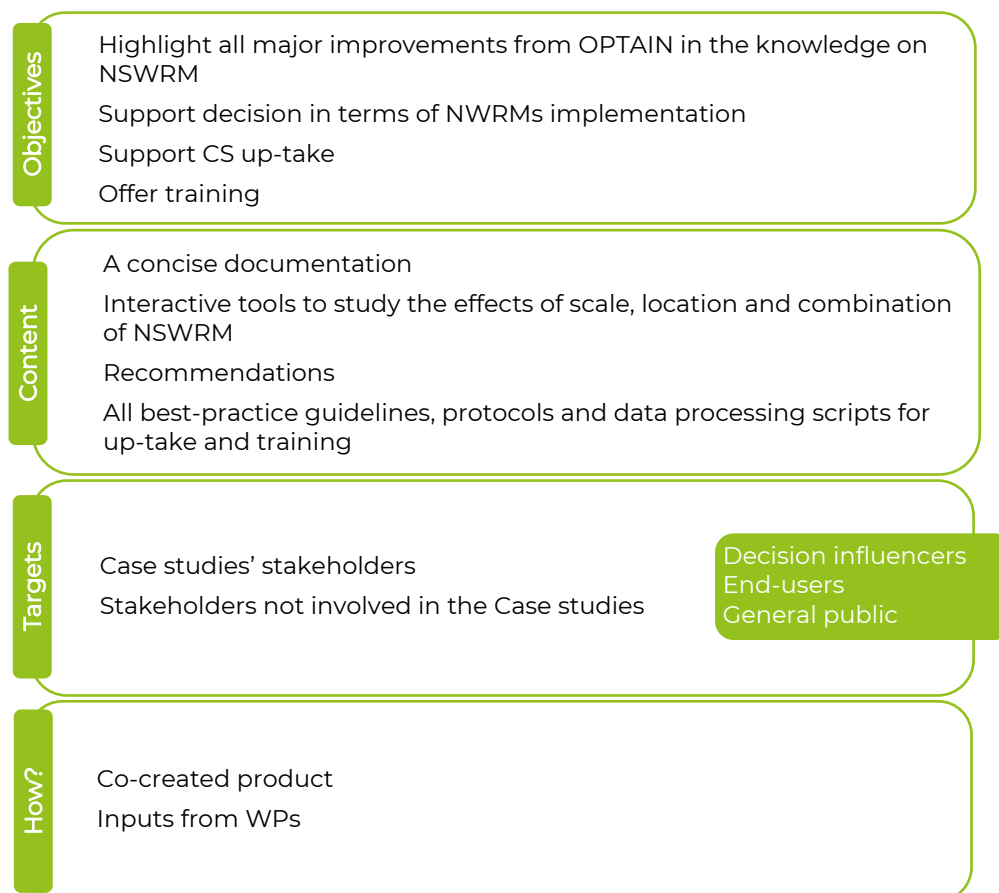
2.5. Synthetic view on the Learning Environment from the Description of Action

Based on the DoA and materials delivered by WP1 and WP7 in terms of target audiences, the synthetic vision of the LE can be summarized. As described in Figure 6, four categories of knowledge already exist. The objectives and ambitions of the LE are well set. The envisaged content is aligned with the objectives and provides the new knowledge and tools to better understand the multiple benefits of NRWSM and support decision making while providing the materials for trainings. As highlighted in section 1.3, LE will gather its materials from WPs outputs both on the technological (i.e. exploration and valuation tools) and non-technological sides (i.e. policy, recommendations).

The understanding of the target audiences and end-users profiles benefited from WP1 and WP7 activities during the first year of the project. Information provided by these two WPs are highly relevant and help understanding that the two main categories of targets addressed are (i) stakeholders involved in the CS and (i) stakeholders outside the CS. The two categories are composed of similar profiles of stakeholders (decision influencers, end-users and general public).

The DoA also delivered important clues on the development principles of the LE. The LE development is based on the WPs progress and is embedded in a co-creation process among the partners of the project on one hand and with the stakeholders involved in the CS on the other hand.

Figure 6: Learning Environment- synthetic view from the DoA



3. Partners' vision of OPTAIN Learning Environment

As already stated, one key challenge is to deliver a useful LE that reflects on the objectives of the project and reach the partners and end-users' needs and expectations. The involvement of the partners is crucial to set the vision and elaborate the development strategy in a collaborative and co-creative manner as they will also be the main content providers.

The partners' visions of the LE have been elaborated from the different interactions organised over the first year of the project. Annex 4 presents them chronologically starting from the projects' kick off meeting and ending by the second WP7 workshop that was partly dedicated to the LE development, including a series of eight interviews held with the WP leaders. The following sections summarised the key feedbacks provided by the partners during these interactions. Figure 8 provides a synthetic view by presenting partners' LE vision.

3.1. Partners' general view

During the interviews, partners were asked to provide keywords to illustrate the LE. As shown on the following figure, these are related to the functionalities of the LE assuming the content is NSWRM related. They highlight the importance of developing a LE that makes sense for the potential end-users and provides a user-friendly experience to share, learn and decide.

Figure 7: Partners' keywords to describe the Learning environment



The focus of the keywords is strongly related to the different dimensions of the knowledge and how to convey that knowledge thanks to the information, communication, network based on an attractive and user-friendly LE.

3.2. Partners' perception on the objectives

The objectives set in the DoA are totally meaningful (build capacity, provide training formats, evaluate and explore the effectiveness of NWSRM and allow easy access to the projects outcomes). The propositions made by the partners consolidate these objectives and provide illustrations that will be taken into account when developing the Learning Environment.

An additional objective was added related to the networking dimension of the LE highlighting the purpose of engagement with the potential users and offer them the possibility to share on how to implement measures.

The measures, their appropriation, the important role of the MARG with a strong background of raising awareness are the main story behind the objectives.

3.3. Partners' perception on the target audiences

The DoA and the Communication and dissemination strategy highlighted potential end-users of the LE (see table 1). Along the process of WP7 workshops and interviews, partners could complete and classify by importance the different targets of the LE. Four main categories of end-users have been set.

3.3.1. CS and the stakeholders involved in the MARG

The first category relates to the inner targets of OPTAIN and is composed of agri-advisors, regional & local authorities, land users and farmers (specialists at the field level). The challenge to directly get in touch with farmers has been strongly highlighted. Farmers are somehow the golden target as they implement NSWRM but their schedule and interest might not allow them to access the LE. So the agri-advisors could play a major role to bring to awareness on such a tool to farmers.

The interview allowed to highlight the benefits for stakeholders to use the LE. The main benefits are to get information first, to discuss with the MARG, to provide an easy access to the project results, to use the project's results to discuss, to see what is behind the solutions proposed on the LE, to convince on the project efficiency and also to help stakeholders to realise that their contribution has a value.

3.3.2. Institutional stakeholders

The second category combines:

- Regulation and policy entities at the national and European levels such as the ministries, water directorates and the European Commission. In that case, the benefit of the LE is to well report to the European Commission and show the added-value of OPTAIN LE thanks to evidence-based results from the 14 CS, while supporting the planning of the Water Directive Framework, and water and agricultural policy agendas
- Decision makers, international planners, donors, environmental agencies. In the frame of the decision makers, the land users, land owners, local authorities, farmer advisors and consultants in water management have been mentioned outside the scope of OPTAIN CS and MARG. The benefits of the LE refer to different arguments such as providing evidences for maintaining/increasing the value of

properties, initiating discussion, showing the economic and environmental balance and supporting decision making with preferred solutions.

3.3.3. Scientific and academic communities

The third category refers to stakeholders that are not directly involved in implementing NSWRM but are aware of the environmental issues. The scientists and modelling community compose this third category. The benefit of the LE relies that case in providing a better understanding and more based knowledge for the implementation of certain measures.

3.3.4. The public

The fourth category bring together very different profiles which share their non-awareness in NSWRM. This category is composed of the students from high school and the civil society.

3.4. Partners' perception on the types of content

The pre-defined types of content of the LE have been illustrated by the partners and one type of content has been added related to the pilot case.

- **Interactive exploration tool.** This content of the LE refers to the Pareto-Optimal solutions which will provide NSWRM implementation examples. The models won't be run online.
- **NSWRM catalogue.** A specific part of the LE will be dedicated to the catalogue of measures to provide a documented overview from WOCAT and NWRM catalogues.
- **MOOC, Apps, E-book, Videos.** A part of the LE will provide tools to assist training on NSWRM.
- **Data software.** The set behind the scene that will provide experience and inspiration that target audience will connect with.
- **Policy recommendations.** This part of the LE aims at providing best practice guidelines and show what has been learnt based on the experience with the MARG. A type of content could be factsheet per measure.
- **Case studies and general information.** This type of content was not directly mentioned in the DoA but should nevertheless find a visible place on the LE

3.5. Partners' perception on the design

Three key dimensions to design the Learning Environment were highlighted.

- **User-friendly.** At the general scale, the LE should propose an easy experience to explore the measures and the different contents of the LE. It should be attractive and content intuitive, simple to use with impact full outcomes. Different languages have to be considered to ensure the local stakeholders can understand the information and be part of the LE experience.
- **Make clear room for the measures.** The measures have been spotted has a potential entrance into the LE. In that case, a variety of content could be considered such as an overview of each measure studied in relation with the catalogue, and the ones applied in the CS. This part could be used for discussion among stakeholders and also show the implementation practice. A demo version

could be associated to demonstrate NSWRM optimisation mechanism and their multiple benefits.

- **General setting.** Different options have been highlighted:
 - One deals with a decision tree approach that would be based on the stakeholders' profiles entering the LE.
 - The other one deals with a matrix approach. The different types of knowledge would be directly accessible. An area dedicated to the spatial aspects would also be available. This would lead to the measures and the catalogue. A collaborative space would be also provided for stakeholders to share experience, give feedbacks on certain measures. Forum could be organised by bio-regions.

In parallel, the LE could provide a gamification level that would target the stakeholders who are not familiar with NSWRM and a second level for the aware stakeholders.

3.6. Partners' perception on the development steps, issues and need

Different steps, issues and needs have been identified by the partners to ensure the LE fulfils its different objectives and is successfully used during the time frame of the project and beyond. All these elements are important to set the development strategy¹⁰.

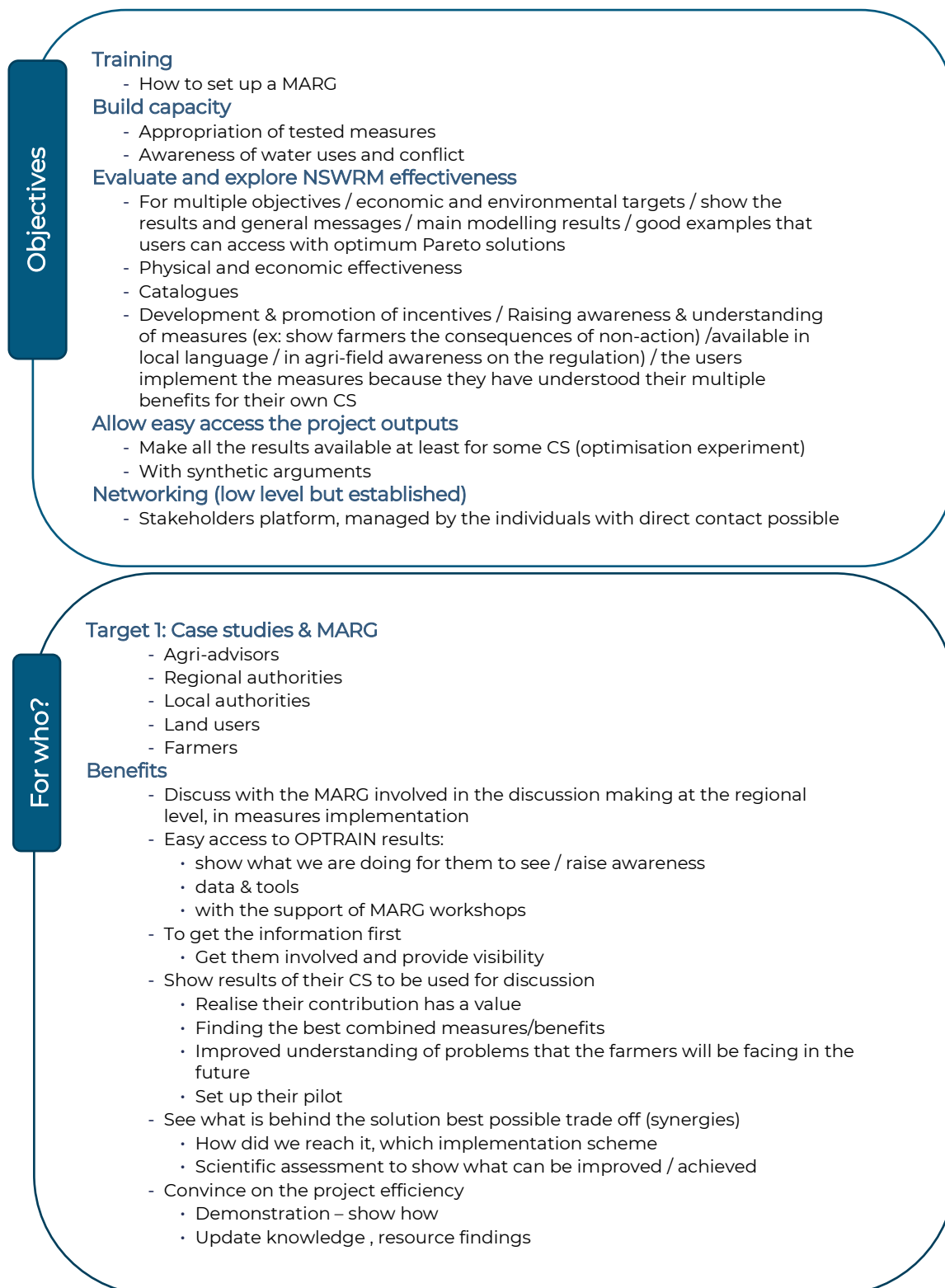
The main steps to develop the LE are (i) to agree on the concept, which should be discussed at the WP level. (ii) The second step would be to set the initial design and engage with the users through a gamification approach to start with. (iii) Finally, the third step would deal with the demo version of the LE that could get feedbacks from partners during workshops and start the iteration process that would lead to the final version. It is also acknowledged that time will be needed to develop the LE and that a general and flexible agenda should be set.

A general issue to be considered is that the design provides tailored information targeting the different end-users. A series of questions (see annex 1) has been expressed by the partners. Then, specific issues related to different parts of the LE (i.e. exploration tools, the catalogues) have been stressed. For example, the exploration tools will require huge computer efforts and reiteration as the development of the catalogue is based on the adjustment between the ambitions and the resources.

The need to showcase is one important aspect of the LE. This dimension embraces different parts of the LE such as CS and the MARG, the learning experience (i.e. how the run a CS), the use of the interactive tools, etc.

¹⁰ see annex 4 for the summary of the interviews

Figure 8: Learning Environment- vision from OPTAIN partners



For who?
Target 2: Institutional

European Commission
 Decision makers
 • Land users / land owners
 International and national planners
 Donors

Target 3: Aware end-users

Scientific and modelling community

Target 4: Public

School, environmental courses
 Civil society

Benefits

Well report to the European Commission
 Provide arguments to the European Commission to internally convince within the different Directorates General on the multiple benefits of NSWRM (ex: DG Agri)
 Policy impact (EU agenda on water –agri policies)
 Plan for the Water Framework Directive
 Show the added value

- 14 CS results to be synthesised
- Demonstrate the multi-functionalities of NSWRM to increase resilience and reduce costs
- Convince on the relevance for managing, increasing the value of their properties
- Show the balance between environmental and economic interests
- Show the diversity across Europe (Climate change on water and agriculture, how different measures work differently in different places)
- Support the decision support making process
- Help to give ideas to the different target groups / discuss the results to stimulate the discussion on what can be tolerated
- Identify preferred solutions at the bio-regional and catchment levels
- Understand better / give more based knowledge to implement certain measures
- Increase reliability of OPTAIN findings

Type of content
Interactive exploration tool

Pareto optimal solutions
 Access solution, not run models

NSWRM catalogue

Overview on documented measures
 link on WOCAT, NSWRM

MOOC apps, E-Book, videos

Tool to assist training effects on OPTAIN LE

Data software

Experience/inspirations that target audiences would connect with

Policy recommendations

Best practice guidelines / what did we learn?
 Experiences gathered with the MARG
 Factsheet per measures

Pilot case

General information

Challenges and steps

What level of information?

How can we explain to a regional authority that OPTAIN can help them to solve their problems?

How make people look for the LE?

How is the information exposed?
 How to reach the targeted audiences?
 Time management of stakeholders: when, where are very important (ex: in restaurants or pub for farmers)
 How to access the EU level (Agri/Water/Climate Change), make connection soon

How to handle country by country the decision making

How can OPTAIN help to set the LE, how to engage?

Show case

MARG workshops are important to address these aspects, to make them aware of this part of the LE / how do they see the interactive tool
 Learning experience: how to run a CS

Huge data and computer efforts

Embed the exploration tool in to the LE
 Reiteration
 Link between WOCAT and NWRM is related to the ambitions and resources

Approach

Level approach according to the target audiences combined with a multiple level of knowledge / development for different groups
 Focus on one kind of audience and adapt the content?
 How to make it cute?
 Simplify a one 100 pages documents into one game / simplify with accurate results
 Intermediary steps are important / which interactive pilots should be developed so the results can be replaced once available
 The LE can be improved step by step
 Time is needed to develop the LE
 Set a general agenda that is flexible

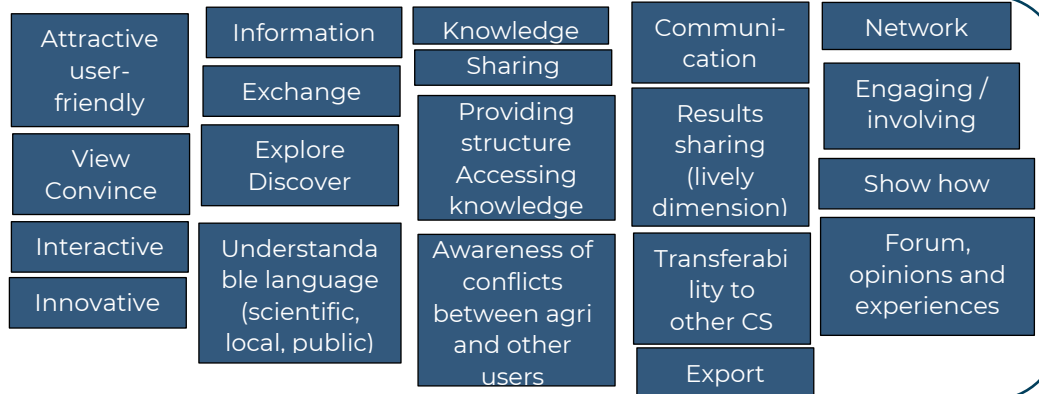
Scenario to develop the LE

- Develop / agree in the concept altogether – to be discussed at the WP level
- Initial design, engage with the users (game to start)
- Demonstration, feedbacks from the partners (workshops)

Scenario to develop the catalogue

- Agree on the structure of the catalogue to decide the visible part the LE, the links to WOCAT and NWRM
 - What results do we want to bring together
 - Update or replace and show their results
- Decide what we show: visualisation, modelling scenarios
- Decide what will be general of CS specific
 - Good examples of CS that show combination of measures

Key words



4. Strategy implementation

As shown in the figure 2, the development strategy of the LE follows guiding principles composed of two stages. The first stage deals with the vision of the LE and mainly addresses the following questions: why having the LE? For who? And which content? These elements were developed over the first year of the project and are presented in section 5.

The second stage of the development strategy deals with development process of the LE and is presented in the following sections.

4.1. LE development workforce

The LE is a co-created product delivered by OPTAIN. It will gather partners' inputs to provide the content. Its development process will engage with potential end-users at all the major phases to ensure their needs and feedbacks are gathered. This will also ensure that the relevant knowledge is provided for them to understand the multiple benefits of NSWRM and support them to implement measures

The work force is strongly based on the key actors mentioned above. It is composed of OiEau as the leader of the task to develop the LE with the support of the coordinator UFZ.

Dedicated WGs related to each LE type of content will be launched at the beginning of the second year. The mission of the working groups is to provide the inputs for the LE and also internally address the issues to ensure the content is compatible with the design of the LE. The CS play also an important role. Through the MARG mechanism, stakeholders are providers of needs and in the later phase evaluator of the LE.

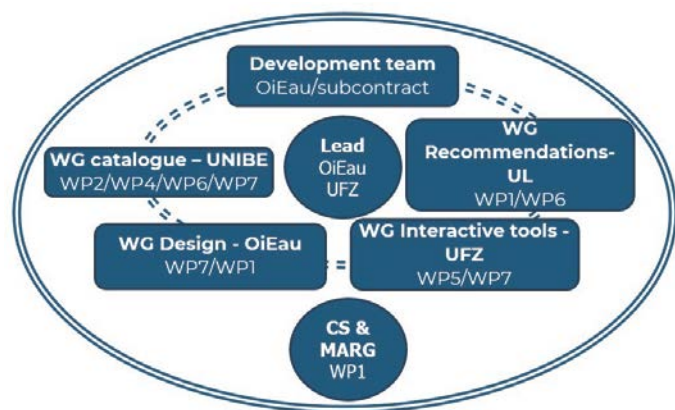
As task lead, OiEau will organize regular virtual meetings with the WGs and participate to the MARG events (already scheduled in the MARG calendar¹¹). The monthly WP leaders meetings will provide the opportunity to update on the progress.

4.2. Plan

By the end of the second year, the first LE online version will be delivered. The two key milestones are:

- (i) to identify from the WGs which content should be available by the end of August 2022 their related format. Each WG has challenges to address. For example, the WG on the catalogue will have to decide how to link the two catalogues (WOCAT and nrwm.eu) to the LE in a complementarity way.

Figure 9: Learning Environment work force



¹¹ The MARG calendar is available in D7.2 Communication and dissemination strategy

(ii) to agree on the design and content of the LE. The dedicated WG will lead this activity to set a decision by the end of February 2022.

Both milestones will lead to the development of the LE technical requirement by OiEau during March 2022. The development of the LE is planned to start in April 2022. The process will benefit from regular meetings with WP leaders, WGs, partners and MARG, so each stage of the development are explained and feedbacks can be gathered.

During the second year of the project, the WGs will be launched in September 2021 at the 2nd OPTAIN General Assembly. Their roadmap will be explained by OiEau and discussed so the two milestones can be prepared and reached. The roadmap consists for each WG in identifying the content that can be delivered during the first semester of 2022. The format of the content that the WGs expect to be displayed on the LE (documents, software, and data) should also be explained. These elements are important for the LE technical requirements to be prepared by OiEau and ensure the LE is structured in a compliant way with the WGs expectations. The plan is to work on the technical requirement during the first trimester of 2022. The preparation and development of the technical requirements will be elaborated from the WGs feedbacks and take into account the overall planning of OPTAIN deliveries, such as the LE catalogue and the links towards the WOCAT and NWRM ones.

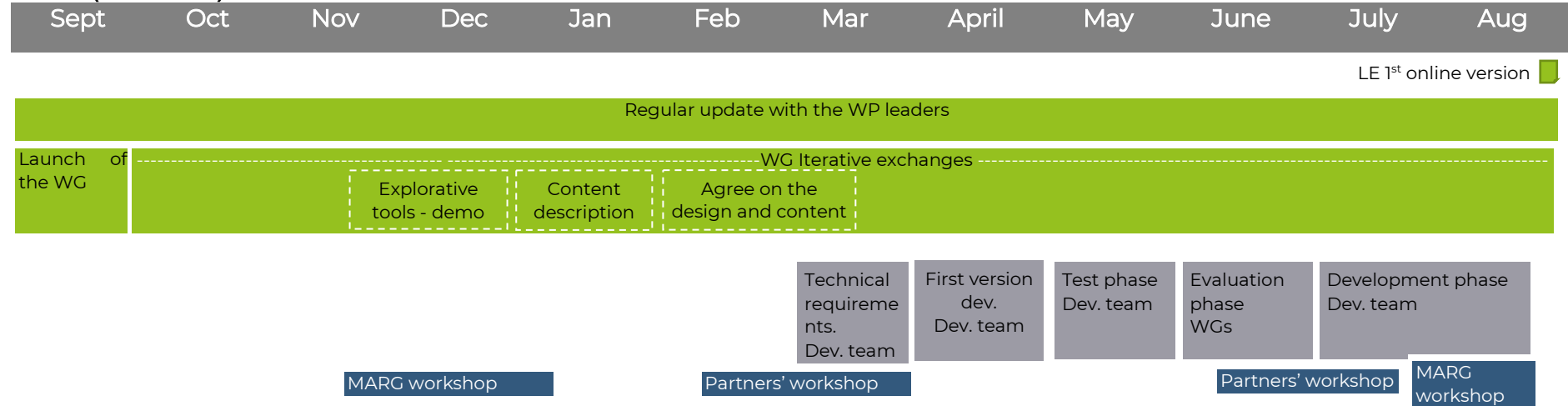
The third year will be mainly dedicated to the update of the LE taking into account the evaluation from the CS and MARG stakeholders (as introduced in Figure 3). By, the end of year 3, the development strategy will be updated. A state of progress will be made so the planning will be adapted for the last two years of the project.

Table 2: LE development - plan for year 2 and 3

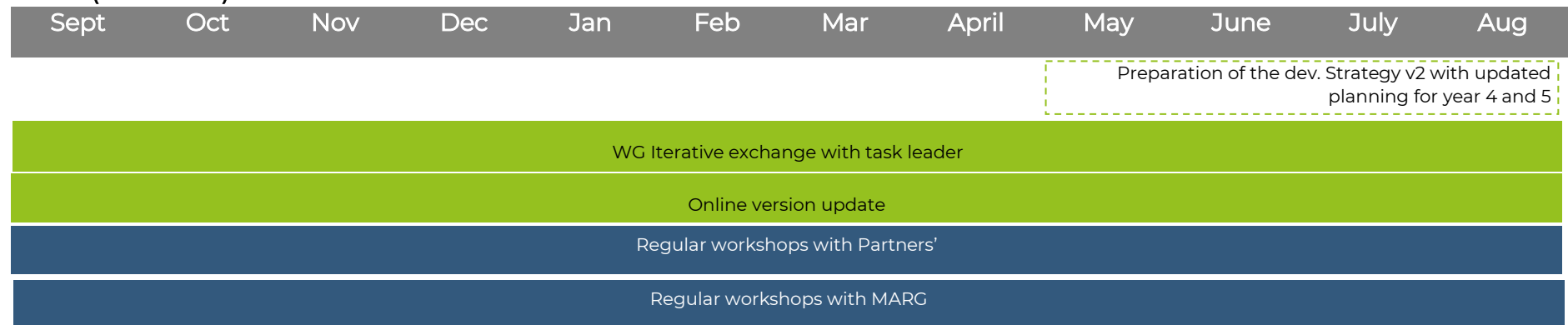
Key dates



Year 2 (2021-2022)



Year 3 (2022-2023)



Following the LE's vision, a very first draft design has been prepared to set a simple representation of what could be the different layers of the LE and how to reach the different type of knowledge. This represents the starting point to elaborate the technical requirements.

As shown on Figure 11, the matrix approach has been chosen with five main blocks of knowledge that would be available from the front page of the LE. They are indicated on the square blue cells.

The content that is foreseen to be ready for the first online version is indicated by the clear blue cells that are circled in bold.

Each main targets of each block of knowledge is indicated by the green cells as the objectives are mentioned in grey ones, knowing that a transversal objective is to provide an easy access to OPTAIN outcomes.

The *Learn about NSWRM* section is addressed to the public target and will progressively propose a gamification approach. To start with, NSWRM issues, documentation on how to and a forum could be the related content proposed in the first online version.

The *Case studies* block of knowledge would first propose some documentation on the CS, the preliminary results achieved over the first two years of the project and explore the possibilities of supporting networking activities among stakeholders. The related objectives are to evaluate, explore NSWRM but also to have the network dimension among stakeholders.

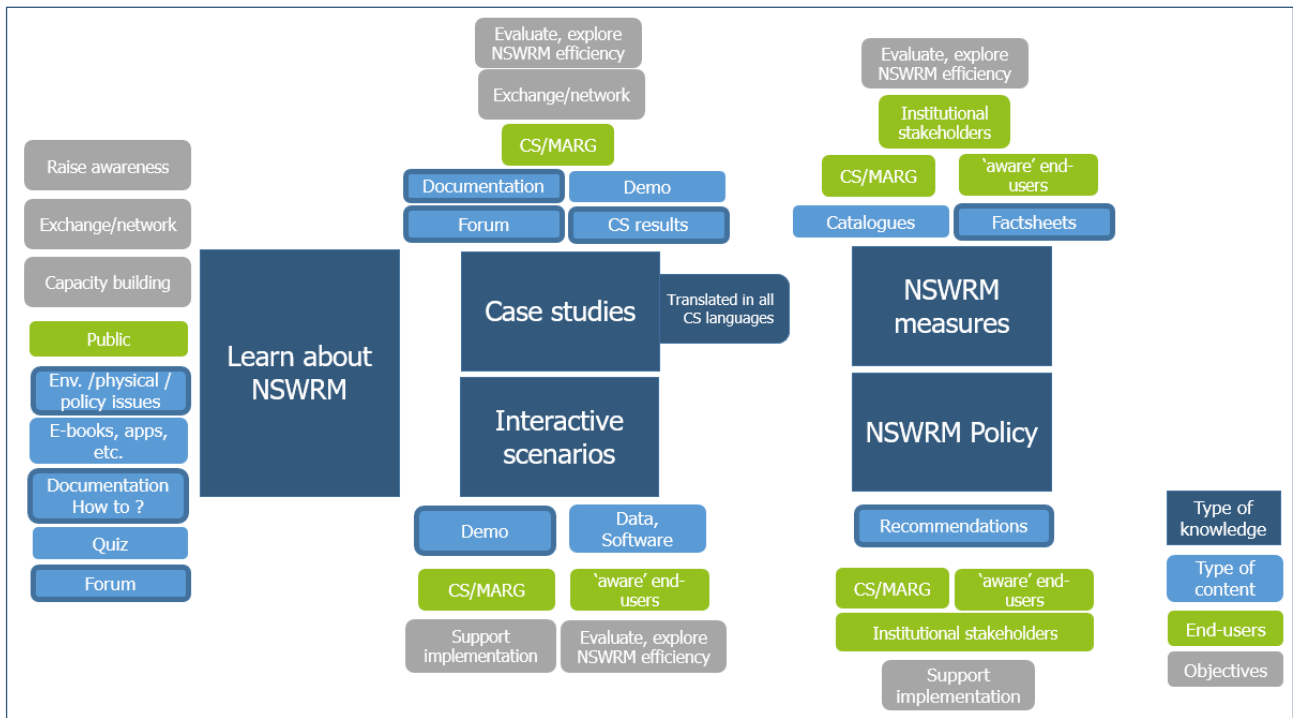
The *iterative scenarios* section should provide demo on NSWRM results and show their multiple benefits. This section is primary addressed to CS and MARG stakeholders as well as the 'aware' end-users. The objectives of this section is to support the implementation of measures while evaluating and exploring their efficiency.

The *NSWRM measures* block of knowledge focusses on presenting the different existing and applied measures. The key related content refers to NSWRM catalogue that will be able at the end of the project. For the time being, it is difficult to assess when the catalogue will be ready. So, in the meantime, it is proposed to provide measures factsheet. The first ones will be accessible in August 2022.

The *NSWRM policy* section will progressively grow during the time frame of the project. Some first recommendations will be ready by the end of August 2022.

These five categories of knowledge are the first representation of OPTAIN partners' vision and expectations for the LE. The balance is found between the technical and vernacular types of knowledge so the user-friendly characteristic of the LE is well anticipated.

Figure 10: First draft representation of the Learning Environment design



5. Conclusion and next steps

The LE is an ambitious output of OPTAIN that will combine existing and new evidence based knowledge on NSWRM. By the end of the project, the LE will gather all the key innovation delivered by OPTAIN. At a demonstration scale with the 14 case studies, it will include the interactive tools and provide a better understanding on what are the measures and their multiple benefits with the catalogues. Building on that, it will provide recommendations at the policy level, while offering the opportunities for new comers to the topic to discover what the measures are about with the learn about NSWRM section.

The potential targeted audiences or end-users are gathering very different profiles of stakeholders. The stakeholders' dimension is a very important element for the development of the LE, as the objectives of OPTAIN are to reach out for a maximum of end-users. Over the first year, many occasions were set by WP7 to discuss and engage with the partners in order to be coherent with the other activities of the projects (WP1 for example also deals with stakeholders as the MARG plays an interface role towards the CS) and to set a participative and co-creative approach to deliver the LE).

The overall method used to set the LE development strategy is based on guiding principles. The first ones led to detail the partners' vision of the LE, which is the main output of year 1 presented in this report. This was done by analysing the objectives set in the DoA and gathering partners' understating and expectations. Then, the second series of guiding principles relies on the Agile approach and consist in planning the development, designing, testing and evaluating the LE. These principles will be applied from now on, starting with the launch of the WGs dedicated to each part of the LE during the second General Assembly of OPTAIN at the end of September 2021. Their mission over the second year of the project will be to define the content of the LE that can be available during the first semester of 2022 and the related technical requirement so the development of the structure of the LE can start. The stakeholders' approach will be maintained during the whole period. It starts with a close collaboration with the CS and MARG during the second year that will be progressively open up to external stakeholders during the following year of the project (thanks to specific events such as the summer school and dedicated regional workshops).

This deliverable will be updated twice to report on the progress and explain the new steps. The general approach is to be flexible which will be allowed by the regular exchange within the work force among the development team, the WGs, the CS & MARG.

PART 2

Part 2 of deliverable D7.4 presents the first update of the OPTAIN Learning Environment development strategy. It explains the work undertaken from September 2021 to August 2023.

This first update shows how the conceptual and technical sides of the strategy have been evolved and adapted according to the overall progress of the project. It marks the start of the online development of the Learning Environment from the first mock-up to the online version presented during the OPTAIN Summer School (July 2023). It concludes with the next steps for the further development of all parts of the LE.

Progress Update of Part 2

This second update of D7.4 presents the progress made between 2023 to February 2025. The LE has evolved from an early prototype to an interactive online version, with significant advancements in learning pathways, navigation, cross-linking, and accessibility.

By the end of 2025, the fully operational LE will serve as a dynamic and accessible platform supporting long-term knowledge-sharing across Europe.

To clearly highlight the latest developments, a progress update box has been added under each section summarizing key progress and enhancements.

Introduction

Starting from the first design of the LE validated by the OPTAIN partners (part 1), the work from September 2021 to August 2023 consisted of developing the first online version.

The first step focused on developing a mock-up version (section 1) so that partners and external stakeholders could react and provide feedback on the design and content of the LE. This step also served to align the conceptual development that took place in the first year of the project with the technical development of the online version by addressing the questions and the discussions that took place on the content, structure and terminology.

The second step dealt with the development of the online version. Section 2 presents the initial technical development of the LE and the decisions regarding the platform.

Section 3 focused on the main features (i.e. navigation mode, cross-links and user experience) of the LE. Section 4 presents the main sections of the LE (i.e. learn about, catalogues, policies, exploration tools, expert and scientific area, explorative tools and media centre) of the LE.

1. OPTAIN Learning Environment: conceptual development

One key challenge to develop the LE in OPTAIN is to align the vision (combining the expectations from the Grant Agreement and the partners expectations once the project has started, see PART 1, section 3.6) with the technical and financial constraints. Another key challenge is to be able to tailor the development of the LE with the availability of the knowledge and results delivered by the project.

To ensure that the LE tackles as much as possible those expectations, an iterative process has been put into place. Based on the vision, a first mock-up was developed using the justinmind¹² online tool. This mock-up was then used as a basis for discussion with the partners as well as during the first series of interviews to set OPTAIN training analysis (D7.5). This work started after OPTAINs second General Assembly (GA) in September 2021 and lasted until the end of 2022. After consolidating the feedbacks from the mock-up and discussing specific concepts such as indicators, the development of the first online version of the LE was started. As explained in section 2, the online version of OPTAIN LE is now available¹³. From now on, work will focus on finalising the different parts of the LE, ensuring that the training dimension is also well set.

1.1. Moving towards the Learning Environment mock-up

The results of the first version of D7.4 were used to create the first mock-up and move from the vision to the platform’s representation.

Figure 1 presents the first mock-up of the home page. We can see the 7 sections of information on the right side (learn about, Case studies, NSWRM measures, NSWRM policies, Explorative tools, Media centre and Experts & scientific area). In addition, to help users to find their way within the platform, additional sections were envisaged:

- 4 transversal thematic entry points with the OPTAIN relevant sections of the LE flooding, water and soil pollution, farming practices and implementation costs.
- A stakeholder´s profiles entry point was also suggested with the “get personal hints...” at the bottom on the left. This would allow users to ask for recommendations for specific cases / conditions.
- Finally, the most visited section would help users to have direct access the knowledge that is most sought after.

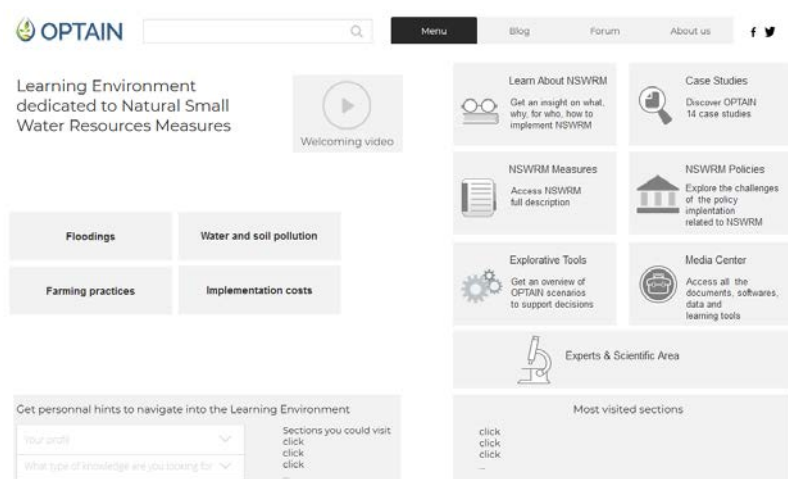


Figure 11: OPTAIN Learning Environment mock-up, home page

¹² <https://www.justinmind.com/>

¹³ <https://optainle.dev.oieau.fr/> (ID: optainle; Password: 20optainle23)

This approach allowed the project partners to reflect on the development of the content, as explained on the following section.

The mock-up was officially presented during the third OPTAIN General Assembly in Balatongyörök, Hungary, in September 2022. Special working sessions were organized with the project partners to gather their feedback and highlight the types of content that would best fit each part of the LE. One key question that has been raised concerns the indicators that should be used to represent the measures. The item opened a reflection that took place during the various meetings organised in the first semester of 2023.

Figure 12: OPTAIN Learning Environment: Home page of the six blocks of information



1.2. Moving towards the development of the content

During the first half of 2023, OiEau organised a series of meetings with partners in order to discuss the content of the LE. The mock-up proposed a first organisation of the type of content. The discussions during the meetings revealed that the boundaries between the different sections of the LE were not always clear, which also concerned some of the used concepts lying, for instance, behind the indicators.

The indicators are a transversal feature to OPTAIN activities, used for the characterisation of the measures and related catalogue (WP2), the scenarios (WP3), the modelling (WP4), the optimisation (WP5), the explanation of the policy dimension of measures (WP6) and to support stakeholders to understand the impact of NSWRM implementation and support their decision-making process (WP1).

During the General Assembly in Hungary (September 2022), the decision was made that in total 8 indicators would be used for each CS: 4 environmental indicators, 4 Socio-economic Performance Indicators (SPI). Nevertheless, caused by limitations of the used algorithm, the optimisation is constrained by the use of 4 indicators. Linked to the hydrological and the economic model, the optimization algorithm identifies the most effective implementation schemes for NSWRM, including their combination and allocation and illustrating trade-offs and synergies among these four indicators (as objectives). Indeed, their characterisation needed clarification from the point of view of the LE development. To get a better state of understanding, OiEau organised a series of meetings.

Meeting related to the catalogue of NSWRM

WP2 is responsible for the development of the OPTAIN NSWRM catalogue based on WOCAT and NWRM.eu catalogues. To decide which fields from WOCAT database and NSWRM would be used in the LE and which type of visualisation should be preferred, UBERN (WP2) and OiEau (WP2, WP7) had a meeting in Paris on January 24 and 25, 2023.

This meeting focused on the NSWRM catalogue. The aim was to set the correspondences between WOCAT, NRWM.eu and the LE catalogues¹⁴ in terms of measures characterisation and related filters. It was reminded that the aim is not to duplicate WOCAT and NWRM.eu on the LE, but to display the relevant information related to the measures from the point view of small-scale management.

In addition to a standard catalogue, the map representation with specific filters was chosen to display information related to the OPTAIN CS.

The issue raised during this meeting was the alignment between the indicators used in WOCAT to describe the measures and the indicators used by the WPs for the scenarios, modelling, optimisation and CS description. For that matter, a series of 4 meetings was organised afterwards.

¹⁴ D2.1 Coherent catalogue with a selection of most promising NSWRMs including results from MARG exchanges (to be used for modelling and optimization) has been used to set the frame of the catalogue section of the LE environment. As this part is based on WOCAT and NWRM.EU further discussions were needed to decide which fields of each database should be used for OPTAIN catalogue. Another item still being considered is the link between the measures and the indicators selected by CS.

Meetings related to the indicators

Four meetings were organised in 2023:

- The first one with UMIL (WP2, WP4) on the SPI indicators on 22 March
- The second one with NIBIO (WP2, WP4) on the environmental indicators on 4 May
- The third one with UFZ (WP5), UBERN (WP2), NIVA (WP1/WP6) and UL (WP6) on a transversal view of the indicators on 11 May
- The fourth one with WULS (WP4) and UMIL (WP2) on 1st June.

During the meetings, it became clear that the indicators are a cross-cutting dimension of the different sections of the LE and activities of the project. The challenge is that the indicators can be understood differently depending on the perspective (i.e. on the policy, modelling, optimisation, etc.). When the partners were initially discussing on how the measures should be illustrated on the LE, the expectation was to have a similar set of indicators (4 EPI and 4 SPI, see deliverable D2.2) for each of the 14 case studies. Nevertheless, the climate conditions, farming practices among other drivers do not allow this approach. Indeed, “water quality” is one of the overarching “indicators”. But water quality cannot be measured or evaluated without using specific environmental indicators, like e.g. N, P or sediment loadings (maximum daily load / total annual load, etc) or the retention potential of measures, according to the specificities of the CS.

The decision was made that two overarching indicators would be used for EPI and for SPI, gathering each 2 indicators selected and tailored to each CS.

Meeting related to policy

WP6 deals with synthesis and policy recommendation of the project results across WPs and case study catchments. In the context of the LE, the contributions of WP6 are important to explain the role of policy in the implementation of NSWRM and to provide legislative recommendations for the future harmonisation of water and agricultural policy at local, regional, national and EU levels. In order to provide a tailored perspective at the level of each CS, WP6 has worked on policy briefs highlighting the different policy instruments that speak in favour of the measure, as well as the benefits and costs of the selected measures. WP6 is also working on a stakeholders’ map to describe the measures from the point of view of the stakeholders’ interaction as it comes to the measure implementation.

A first meeting was organised on 24 March, 2023, with NIVA (WP1/WP6) and UL (WP6). A working meeting was also held during the week (July 2-8, 2023) of the OPTAIN summer school with UL. The aim of the meeting was to clarify the content of the policy part of the LE and in particular to agree on the policy briefs, the indicators and stakeholders landscape proposed by WP6. Based on the content provided by the partners, a first version of the policy section is available (see section 2.3.3).

Meeting related to the explorative tool

The explorative tools part of the LE is directly related to the optimisation process developed by WP5. The LE will display the results of the optimisation for each CS.

During the OPTAIN summer school in Prague (July 2023), OiEau and UFZ initiated discussions among the partners and participants to address the best way to visualise the results of the optimisation. The decision was made to use RShiny, an open source R

package to display the full range of pareto-optimal solutions for each CS, allowing for the identification of the most effective combinations and allocations of NSWRM and illustrating trade-offs and synergies among the four objectives (in form of the indicators (2 SPI, 2 EPI)).

Progress Update of Part 2

Regular online meetings have continued to gather the feedback of partners on the implementation and to ensure improvement of the LE. A dedicated action log has been implemented and shared in order to monitor progress on implementation.

An important milestone was reached in September 2024 with the official presentation of the updated LE version during the OPTAIN General Assembly (GA), which presents a significant step in development.

The final direct access to the LE has been launched: <https://le.optaine.eu>

It provides a public home page, but the content will only be visible to the partners until the public launch, which is planned for the end of year 2025.

Around 100 OPTAIN consortium members have been added as members of the LE to prepare for the GA in September 2024. Ten people have been given "commenting" access rights, allowing them to leave comments on each page of the evolving LE. Even though the LE is still under heavy development, consortium members have been given access to explore it in a continuous and transparent process. This approach made it possible to contribute to a panel discussion during the GA 2024 and will continue until the end of the development. It offers a co-construction system that allows each member to provide feedback during the early stages of development.

During the GA, we were at versions Alpha v5 to v10. In 2025, we expect around 10 releases of a Beta version focusing on user experience (UX). The final public release is planned for spring 2025.

The mobile version was also presented at the GA. To save effort and budget, it is not specific to Android or iOS. The website is designed to fit all devices. However, some parts of the LE will remain more usable on a desktop. Although the LE content will be fully accessible on smartphones and tablets, certain wide matrices or specific tools, such as the R-Shiny application for WP5 optimisation results, will be best viewed on a desktop screen with a minimum resolution width of 1920 pixels.

Further dissemination and discussion took place during the InterVision meeting on November 15th, where the LE was presented in a 40-minute live session, followed by a Q&A to address key questions and gather initial feedback.

On December 13th, a dedicated feedback exchange session was conducted during another InterVision meeting. This 40-minute discussion focused on partner insights, clarification of outstanding tasks already planned to address key concerns, and the identification of additional actions arising from the feedback received.

This iterative process ensures that all contributions are considered and integrated, reinforcing the continuous enhancement and alignment of the LE with the project objectives.

2. OPTAIN Learning Environment: technical development

2.1. Introduction

The technical development primarily focuses on the architectural choice for the LE. The goal is to maximize the utilization of existing components. Additionally, the programming aspect should not require starting from scratch. The LE is developed to support capacity building and to disseminate OPTAINs procedures, methodologies and results and to convey the knowledge co-created by the OPTAIN consortium to NSWRM stakeholders and beyond. In particular, it will address the benefits of NSWRM in managing small agriculture catchments across Europe. By increasing the acceptance and implementation of NSWRMs, the project aims to improve water and nutrient management and enhance agricultural production. Therefore, the LE must be user-friendly enough to help end users to acquire this knowledge.

The sections of the LE of the UX/UI have been well defined. End users need to be able to navigate intuitively through the NSWRMs and retrieve the policies, the case studies' experiments and modelling results as well as the optimization results in different languages.

Sections 2 and 3 explain the steps we are taking to meet the technical objectives related to the development of the LE.

2.2. Fundamentals of the technical choices

LE development is using the popular Open-Source Content Management System Drupal (see Glossary for the technical references). It is based on the PHP language, another very popular open-source technology used to run a website of any complexity.

It is not surprising that an online platform cannot simply be developed from scratch. To be more productive and develop faster, the aim is to reuse some existing components (aka modules) to compose a feature-rich platform. In order to achieve this objective, the three existing components used for the LE are:

- The online NWRM catalogue (www.nwrn.eu) developed with Drupal website, is currently under revision.
- The online WOCAT catalogue, from which we are only taking data to feed the Learning Environment NSWRM catalogue.
- The online ePLANETe knowledge framework, also built with Drupal, which will complete the overall Learning Environment to provide a shared and persistent data and knowledge environment.

The LE will be hosted in the OIEau data centre, based in France, Limoges.

There is a current development website at this URL: <https://optainle.dev.oieau.fr>

The “optainle” prefix stands for OPTAIN Learning Environment. The “dev” part of the address is a signature for a “development” website, meaning that it is an early and neither stable, nor final version of the website. The final release is named the “production” server.

The technical architecture provides a close link between the three main components of knowledge mentioned above during the development of the project. Because the OIEau association is targeting the usage of the ePLANETe knowledge framework to support some dissemination project, the five years of availability of the Learning Environment after the end of the OPTAIN project is already planned.

In other words, building a modular system (composed by the three main components explained above), supported by different entities, increases the solidity of the LE. It extends the general principle of reusability, intensively used in the digital world, and creates a larger and more resilient community of developers.

Another aspect of any LE is to provide a tool that OPTAIN partners could feed directly (via a user account) or indirectly (by providing the content to OIEau) and use during the project life cycle. This leads to a beneficial co-creation effect, where not only the developer creates the Learning Environment. The different partners can already review the development website, provide some input data, test it and give feedback. This rolling effect accelerates the development by involving an important part of the end users during the development phase to be ready at the final phase (delivery of the production website).

The digital world evolves at a very fast pace. Choosing some technologies that will still be popular in ten years' time (project time plus five years after the project) is quite a challenge. Choosing popular and open-source technologies offer a good chance for technical longevity, as there will still be some developers maintaining them. The following three sub-sections provide more details about the robustness of the technical choices we have made.

2.2.1. The Drupal CMS

Drupal exists as an Open Source system since 2001. Wikipedia introduces Drupal as follows: « *Drupal is a free and open source web content management system (CMS) written in PHP and distributed under the GNU General Public License. Drupal provides an open-source back-end framework for at least 14% of the top 10,000 websites worldwide and 1.2% of the top 10 million websites—ranging from personal blogs to corporate, political, and government sites. Systems also use Drupal for knowledge management and for business collaboration.* », (a).

At the International Office of Water, (oieau.org) we use Drupal intensively to develop websites and platform. Therefore, OPTAIN LE enables a co-construction effort, so that content and container (the website aspect, that we call a "theme") can work and progressively be achieved in parallel. Using this very first choice of LE architecture takes advantage of:

- Capitalizing on existing skills at OIEau,
- Benefits of the Drupal worldwide community of developers (since 2001),
- Reusing the existing NWRM database, developed in Drupal at OIEau,
- Helps to keep the budget.

More importantly, a CMS helps to parallelize work. Developers can continue to work on the interfaces and modules, while scientists may already enter data and feed the Learning Environment. This organization of work ease the co-construction of the

resulting website. Also, it gives a direct access, when possible, to the data producers (scientists). It reduces data entry errors by cutting off an intermediation: instead of sending data to developers and wait for data entry and publication, scientists would enter directly their data and directly check if they are correctly exposed in the Learning Environment.

The Learning Environment Drupal website is built using a variety of technologies, such as PHP, Javascript, Symfony (a PHP framework), and Leaflet (for cartography). It also offers a wide range of modules, with over 50,000 currently available. This extensive catalog allows for faster development by leveraging the work already done by the global community of developers. Furthermore, Drupal is specifically designed to accommodate large user communities, ensuring scalability is not an issue.

However, the OPTAIN project has some specific needs to be specifically developed and focused on the learning aspect that the Drupal platform can cover. The following section explains how.

2.2.2. The ePLANETe platform

The ePLANETe platform has been built within the European research context. Several theses have contributed to its construction since 2001 (“The KerBabel Experience: a adventure in the “new” knowledge economy”, Lancelleur, 2019). We use the term “ePLANETe” (pronounced “eplanet”) as a common name for the concept or the online platform. The purpose of the online ePLANETe knowledge platform is to propose a generic design in which science and education produce, consume and share knowledge. To address this generic architecture, ePLANETe is built of generic Galleries of objects (i.e., types of “data”).

There are 24 generic Galleries, grouped in 12 thematic spaces, and grouped in 6 different doorways (see annex 5).

The ePLANETe conceptors stated: *«The ePLANETe platform is a “Knowledge Gateway” on the Internet, made available to and through the members of the Association ePLANETe Blue. It is a complex gateway, with many different doors. The different facets of ePLANETe as a communication and capacity building resource, are complementary by design. A variety of angles of attack and learning experience can be adopted, as seems to best fit the purposes of different User Communities. The platform lives and develops through the cumulative purpose of its members. [...]»*, (B) (see Annex 5 for the full panorama of ePLANETe).

The terminology used for the various Galleries, Spaces and Doorways is deliberately conceptual. It does not designate any particular technology, in order to retain its generic aspect. The Breton names, imbued with mythology, provide a pictorial and conceptual framework. However, when the platform is used in project mode, the terminology vanishes to keep focus on the project terms.

Each Gallery is a Drupal site. The data is partitioned by community of users. Each community has CRUD (Create, Read, Update, Delete) rights, associated with their data only.

Document and reference management is provided by Alfresco Community Edition, in “on premise” mode, i.e. installed on the ePLANETe servers. This software, which is also

Open Source, exists since 2005 and has a traceability architecture that allows it to perpetuate its content with the rigour typical of documentary sources. In particular, it complies with the following standards: "[...] *records management and open government compliance standards worldwide, including ISO 15489, ISO 16175, FOIA, U.S. DoD 5015.02 CH2 and CH3, EgovG, and MoReq. [...]*"¹⁵. This is the only non-Drupal part dedicated to data management. It should be noted that this element of the ePLANETe platform is an optional module. It is not decided yet whether it will be included it in the LE, as it could exceed the budget cost for a non-critical feature.

ePLANETe uses SSO (Single Sign On) authentication. This avoids the need to re-authenticate manually each time when an access to a new Gallery is requested. For the time being, it is also possible to use SSO with an existing Google or Yahoo account. This also is an illustration of delegating some functionalities to skilled existing actors: instead of developing and maintaining an authentication system, we may use the Google or Yahoo one, thus delegating the responsibility of the robustness requirements to a strong team of engineer, that we would never be able to reflect at the LE budget scale. We do the same with the ePLANETe platform: we delegate the Learning Environment logic to it. It is detailed in the following section. Globally speaking, the digital world is growing fast. To deliver matter of interest in this area, and keep control, we must use existing robust component and develop only the specific part of the project, the so-called "business logic" in term of coding structure.

Also, ePLANETe was designed right from the beginning to address ecological economic issues. It fits with the subjects of the OPTAIN project as well as with the requirements stated by the partners regarding the Learning Environment. For those reasons the architecture of ePLANETe has been chosen to develop the OPTAIN Learning Environment.

The OPTAIN Learning Environment consists of a number of different sections of the LE for which ePLANETe already provides data containers that are networked together. This helps to build the Learning Environment, which will be a knowledge gateway.

Technically, the site codenamed, which is the subject of this deliverable, is a Drupal site, reusing a subset of the ePLANETe platform that is already housing several datasets from different research projects. Both websites, LE and ePLANETe will be bound together to deliver the overall Learning Environment.

2.2.3. Resulting organic architecture

The LE, is currently a Drupal v9 website (we are targeting Drupal 10 for final delivery). The prototype is hosted by OIEau at the address <https://optainle.dev.oieau.fr>. Access must be granted. This avoids internet crawler (indexing robots) to index content in their search engines. We should absolutely avoid internet exposure of content under development. For this purpose, user and passwords credentials are given to partners as needed.

Figure 13 shows the main elements of the overall structure of the LE. It represents the main components and data flows. Both have influenced the choice of architecture. It goes without saying that the internet structure supports all data flows, but it is important

¹⁵ <https://www.alfresco.com/information-governance/regulatory-compliance>, visited August, 1st 2023

to specify this. The LE uses an existing infrastructure with predominantly high bandwidths, as the target users are Europeans. We can therefore consider that the resulting site relies on good quality internet speeds for all targeted users. This is the basis for the choice of architecture. The red arrows represent server dependencies. Here we follow the European strategy of developing a high-speed network for all citizens (cf. report “Broadband coverage in Europe 2022”, <https://digital-strategy.ec.europa.eu/fr/library/broadband-coverage-europe-2022>). It thus ensures that the LE access and speed will meet the needs in term of user experience.

Figure 13 clarifies that the overall architecture is organic right from the bottom internet layer up to the LE. The Drupal LE is represented by the yellow layer, including the six main sections of the mockup (see section 1). The orange layer represents the innovative part of the system. It represents the ePLANETe platform. It shows which Gallery is matching the LE main sections of the LE, physically stores its dataset, and is embedded in the LE to seamlessly supply content and features.

Given the generic nature of the ePLANETe platform, much of the LE content can match an existing Gallery that can contain its data. As a result, we use only useful Galleries and combine them in a comprehensive “Portal” where each dataset is interrelated, or crosslinked.

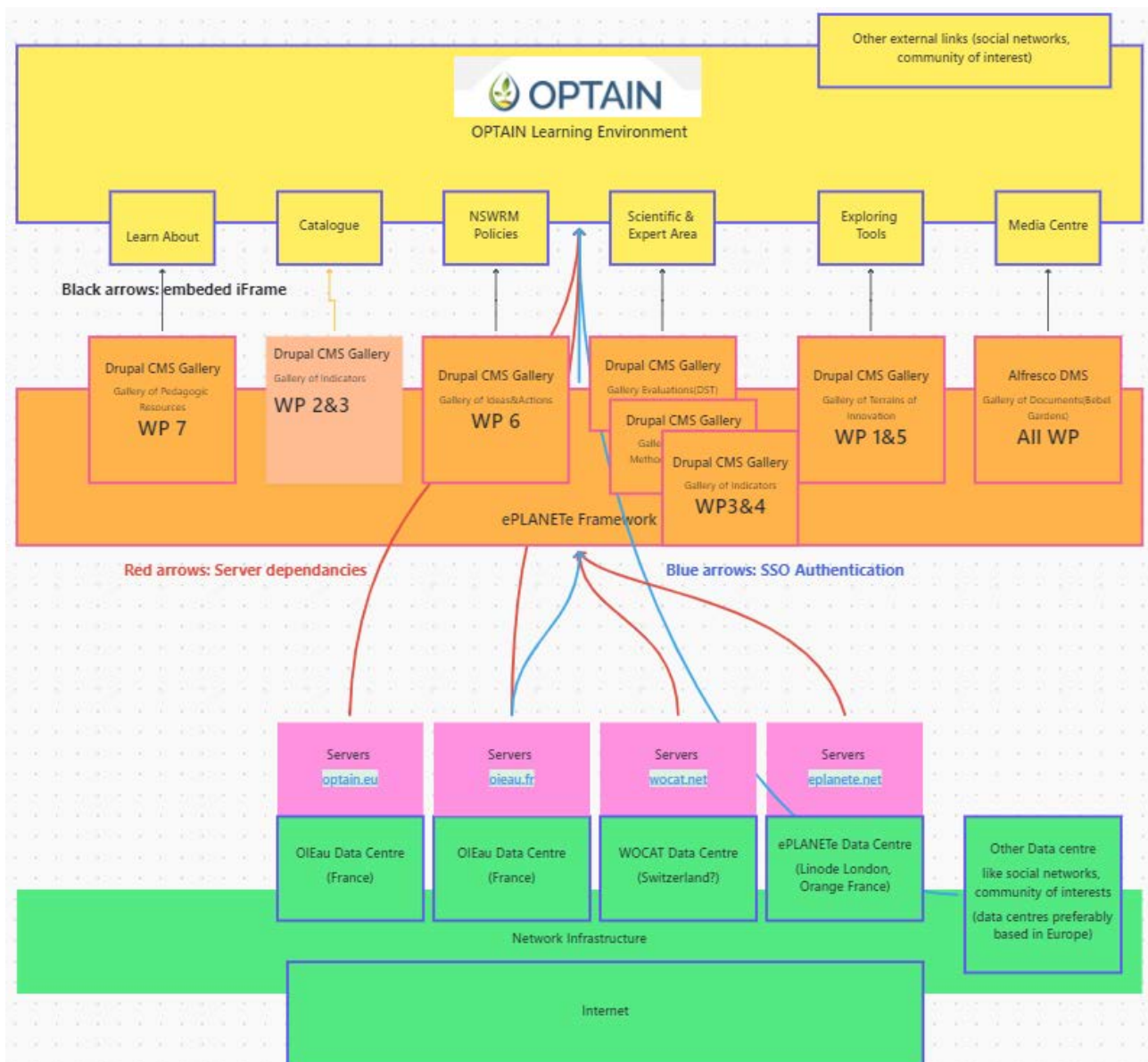


Figure 13: LE organic architecture

The rest of the contents stored directly in the LE (compared to the ePLANETe Gallery embedded content within their respective iFrame) aims to represent the very specific part of information:

- The NSWRM catalogue includes both NSWRM and WOCAT OPTAIN related objects (measures). Technically, WOCAT objects are first pulled from the WOCAT website and stored into the NSWRM catalogue. We are currently experimenting and testing whether it can be directly included in the ePLANETe platform and displayed in an iFrame, similar to other sections of the LE.
- Introduction text content,
- Interactive cartography,
- Interactive RShiny COMOLA results.

The choice of embedding websites within other websites, as in this case the embedding of ePLANETe Galleries within the LE, is not new. Internet speed, and terminal power equipment are increasing (Mac, smartphone, tablet, etc.). By the end of the project, in

year 2025, and according to the European broadband strategy, the LE technical architecture is feasible.

Finally, SSO (Single Sign On) technology makes this composite universe seamless, from the point of view of the connected users (LE offers also a public and anonymous access), which is an essential feature for good productivity as well as for respecting security and individual rights.

The LE may be named a *portal*: it includes its own content, plus iFrame embedding content coming stored in ePLANETe Galleries, plus content pulled through API coming from WOCAT. However, the system is neither closed nor exclusive to any other technology - quite the contrary. For example, the Alfresco platform, aimed to manage documents, included in the ePLaNETe platform, is using the offers APIs and Web interface. This means that both possibilities could be exploited: iFrame (for overlaying the interface) and API (for 'full text' searching). We may use it to store all LE documents. *However, at the time of writing, it is not decided yet. Some better option could be preferred, like keeping documents where they are already (in the OPTAIN project website).*

Finally, the 'Exploring Tools' section of the LE also uses a non-Drupal functionality, namely *RShiny* in client-server mode.

2.2.4. General statement

In summary, the Internet bandwidth in Europe and recent equipment levels (less than 10 years old) mean that existing websites can be reused on a massive scale. This makes it possible to create composite learning and dissemination objects, or in other words, websites that enable dynamic co-construction. The choice of LE architecture is based on these facts. It takes advantages of the generic ePLANETe platform as a data storage area, and its set of functions to build a customized OPTAIN Learning Environment portal. Benefits of this approach are manifold:

- Co-construction and dissemination from the outset of the project,
- Speed in the making,
- Mutual effectiveness of the composite architecture,
- Sustainability of the contents (the ePLANETe platform will exist beyond the 5-year contractual duration of the project),
- Economies of scale, consolidation of European efforts,
- Simplified maintenance,
- Risk reduction in term of variety of skills involved during the website construction and after its delivery on the public space.

3. Presentation of the first online version: main features

3.1. Reminder of objectives and disclaimers

For the first presentation of the online version at OPTAIN summer school in July 2023 the attention was put to the general coherence of all the sections. As a result, the prototype contains all the elements properly placed. The main elements of the graphic charter were also in place. However, all the screens presented in this deliverable are reproduced here for illustrative purposes only and are the sole responsibility of the site developer. The final version will be different in order to perfectly respect the graphic charter, as well as the expected functionalities.

Reminder of the objectives from the point of view of the end user:

- Absolutely oriented to the NSWRM and the Case Studies,
- Presentation of the results of the project,
- Playful,
- With Global search & navigation,
- Tailored for different targeted audience,
- Multilingual,
- Included in cycling process.



Figure 14: "Meet the OPTAIN project" animation, <https://www.optain.eu/>

The study of the LE sections has already been carried out as explained above. The aim of this section is therefore to present a few illustrations of the undergoing work as well as the LE key functionalities.

To avoid the LE being accidentally referenced by search engines such as Google or others, a connection is required.

This sub-section presents all the main LE features, according to the LE requirements.

The other non-structural content types present in the LE are not elaborated upon as they have a minor impact on the overall layout. Additionally, the development effort is scheduled for a later time on the agenda.

Note: The version shown in this document has been presented during the Summer School in Prague, from 2 to 8 July. The version is stored and accessible via the address <https://optainle.dev.oieau.fr> (ask to OIEau partner to get credentials), as shown below.

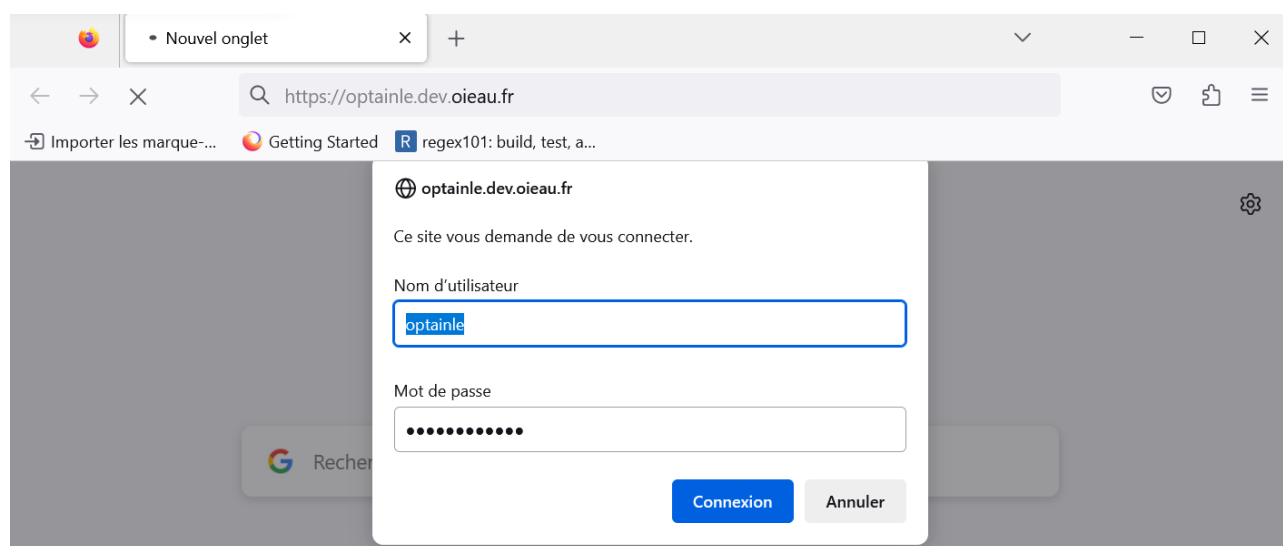


Figure 15: Entering LE prototype (optainle.eplanete.eu)

3.2. Navigation mode

Several navigation systems and entry points exist from the end user point of view. Depending on their interest and level of knowledge of the website, we must offer these different navigation mode to ease content access, i.e. reduce the amount of clicks used to get access to the content. End users are of a two kind:

- Discoverers (accessing the website for the first time),
- Consumers (regularly using the website).

To address both targets, we end up with seven navigation systems:

1. Map (Case Study and NSWRM cartography),
2. Filters (Case Study and NSWRM cartography selection reduction, or focus),
3. Menus (dropdown menu at the top of the window)
4. Catalogue (full list of NSWRM, Case Studies and Policies)
5. Crosslinks (*horizontal* navigation from objects to objects, ex: from NSWRM to Policies, then to Stakeholders, then to Case Studies, etc.)
6. Documentation (folder hierarchy of multimedia contents)
7. Full text search (a plain text box, “à la Google”, to make a full-text search. Return pages, catalogue and Gallery objects, and documentation results, including pdfs and other popular office formats.)

Progress Update of Part 2

- ✓ Map-based navigation finalised.
- ✓ User experience refined with multiple filters.
- ✓ Cross-linking between content sections operational.

3.3. Map, as the landing page

The mockup presented earlier is a representation of different sections and features that the LE will address:

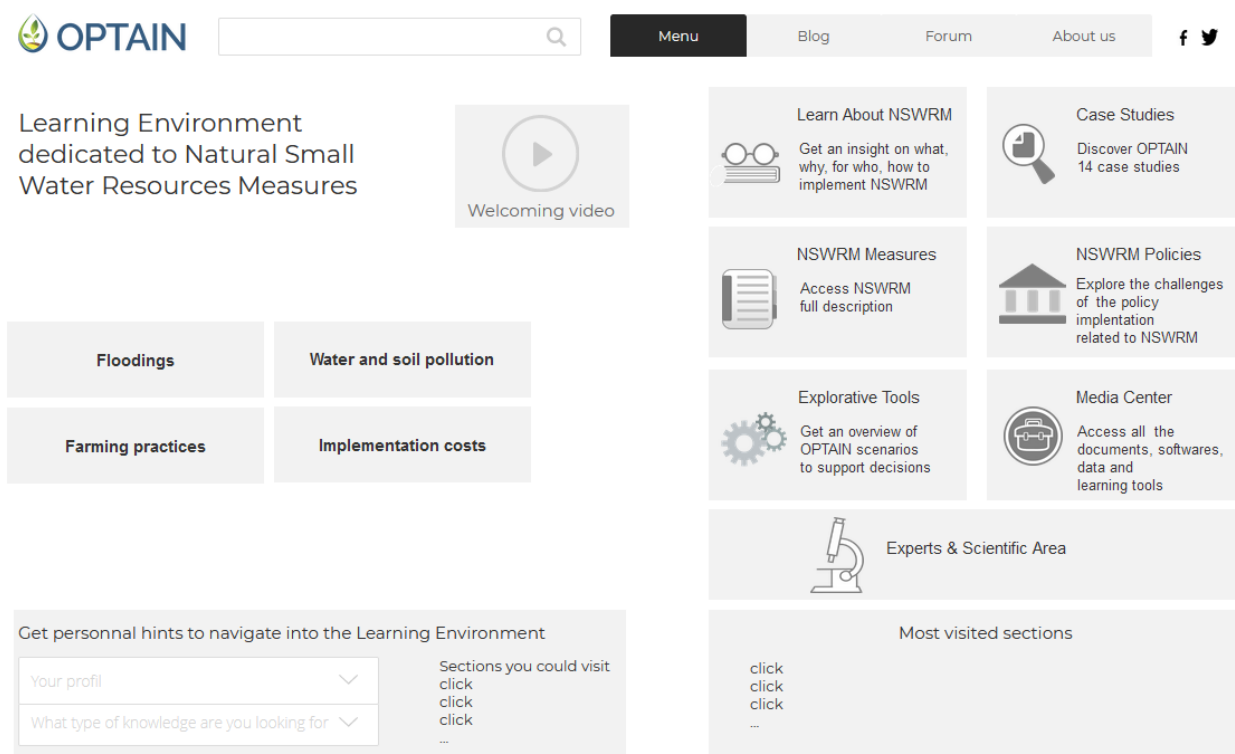


Figure 16: LE mock-up homepage

It serves as a source of inspiration, like a concept car. The result would be close to this first mockup approach. The main idea is to represent in one view all the main sections of the LE that must be addressed, not necessarily *how* they will be access.

For example, at the time of writing, and as already suggested by partners, the popular mapping approach could help to get right to the point, addressing both *explorers* and *consumers* end users. It provides an intuitive access to either the measures or the Case Studies. It also helps to understand the different regions involved. Then it may head all the way down to a Paretian COMOLA interactive tool that gives scenario results (by measure or combination of measures), still using the map by clicking on the catchment area or the field. Popups information would provide the Stakeholder Map delivered by

Policies. In overall, this would improve the user experience by proposing reducing the clicks: the screen would offer a direct access to content or bounce effect to other part.

The mockup (cf. chapter 1.1) is more didactic. As both approaches are valuable, we need to experiment what would fit the best the needs.

Cartography approach is a compromise between the two categories of users aforementioned. It is both a tool for discovery, which is highly intuitive, and a view where visual memory excels at retrieving an acquired situation. Compared to the first mockup proposal, this screen layout returns other items to the main menu, always available at the top, if needed.

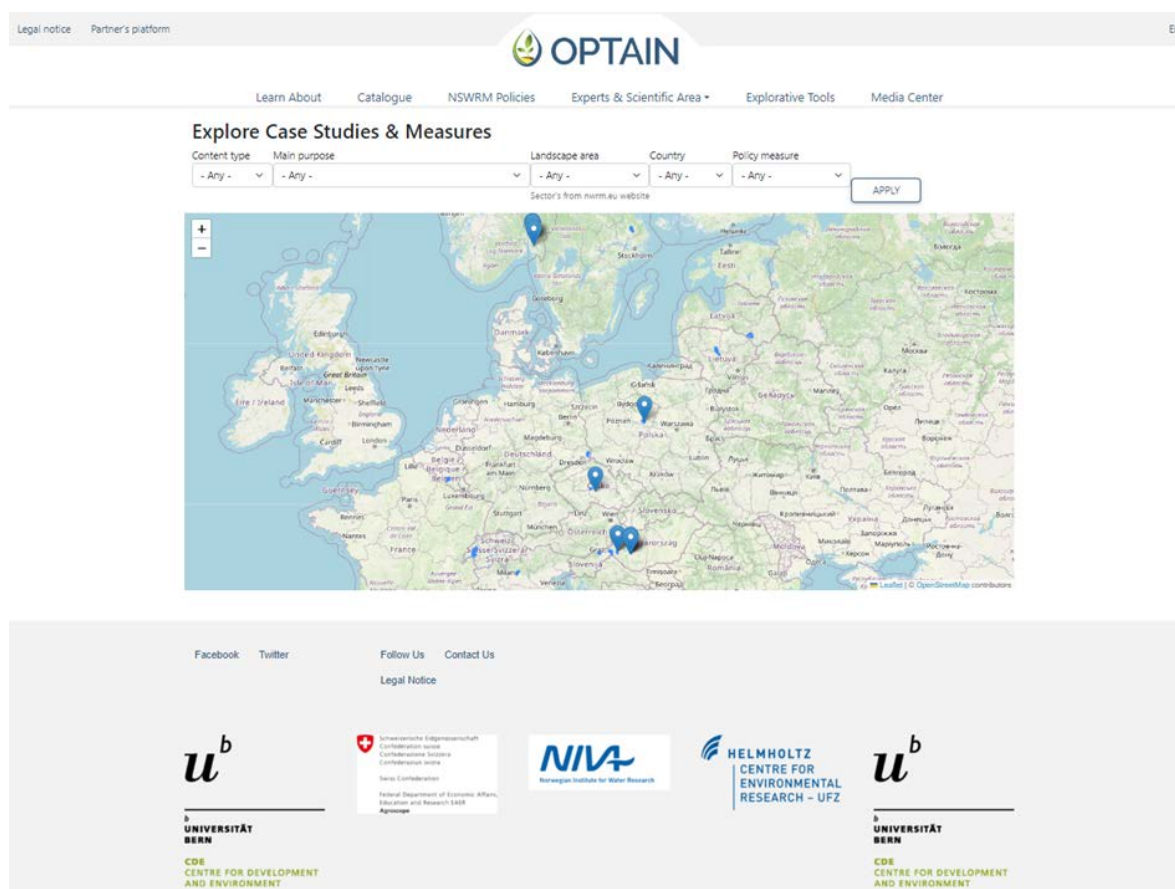


Figure 17: Map navigation, Landing page showing NSWRM and CS (blue pin and blue areas)

[Home](#)

Schwarzer Schöps



German

File

[1_Schwarzer_Schöps_Poster_UFZ.pdf](#)

The Schwarzer Schöps case study is located at the East of Germany. The catchment area is about 136 km², most of which is used as cropland (54%) and grassland (20%). The area is facing an increase of severe floods, soil erosion, and droughts, with negative implications for crop yield stability. In addition, the downstream reservoir Quitzdorf suffers more often from low water tables and high phosphorus pollution which is causing blue-green algae bloom and threatening its multiple services, in particular its important role for nature protection, recreation, and maintaining downstream environmental flows.

OPTAIN seeks for efficient land management strategies and small technical solutions to improve the soils' infiltration and water holding capacities as well as their functioning to filter, buffer and transform pollutants. Increasing the catchment potential for retaining water and nutrients cannot only help to safeguard sustainable reservoir management but also its biodiversity and agricultural productivity.

Contact: Michael Strauch, michael.strauch@ufz.de



OPTimal strategies to reAIN and re-use water and nutrients in small agricultural catchments across different soil-climatic regions in Europe

Case study id 01

UFZ STUDY SITE: SCHWARZER SCHÖPS RIVER BASIN

Figure 18: Map navigation, CS selection example

Progress Update of Part 2

Below are the latest updates, accompanied by screenshots showcasing the new layout and design of the LE. While these updates reflect progress, the final layout and design is planned for mid-2025).

In the menu of this website, the titles displayed in white indicate active sections whose content has already been developed. Conversely, the greyed-out titles represent sections that are currently under development and will soon be available.

- ✓ **Improved interactive mapping and visualisation tools**, enhancing user interaction.
- ✓ **Structured knowledge pathways included:** The LE now includes dedicated pathways tailored to different stakeholders, facilitating a structured approach to (1) explore and learn about NWSRM, (2) access the catalogue of measures, (3) explore the 14 case studies, (4) understand related policies and stakeholders' engagement, (5) discover scientific innovations and (6) support decision making based on measure optimisation.
- ✓ **Enhanced case study integration:** 14 case studies have been mapped and fully integrated into the OPTAIN platform/CS exploration, ensuring comprehensive geographical and thematic coverage.

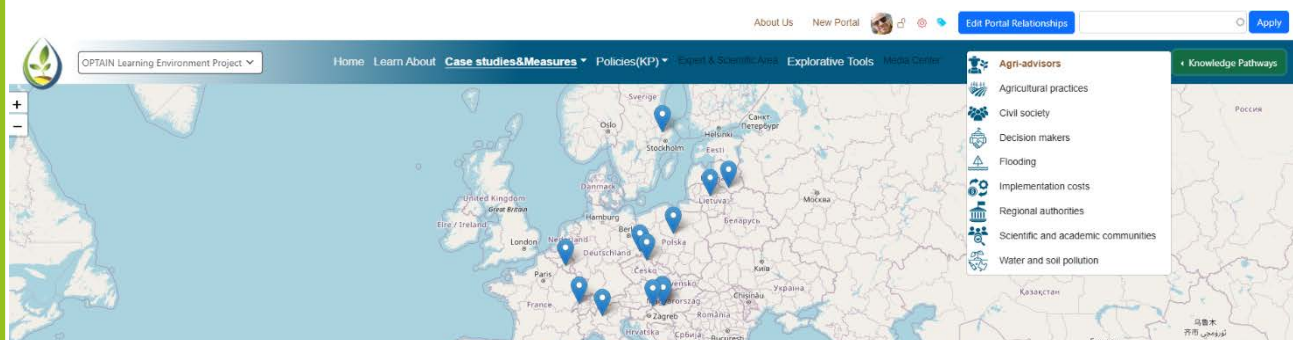


Figure 19: Map navigation and choice of knowledge pathways

- ✓ **Case study structure finalised for enhanced user accessibility**, organised into key thematic sections: General Information, Site Information, Monitoring & Maintenance, Design & Implementation, Lessons & Risks, and Policy & Governance.

The main objective of this update is to build the navigation rails between the CS and the other parts of the LE. Figure 20 below shows an example of using the right column to always show related objects. This could be Knowledge Pathways, NSWORMs, Policies, Documents, etc. Here we can see the hierarchy of these crosslinks organized by Gallery of these objects. The working top name (like “Brocéliande Forest” or “Sustainable Ideas and Actions”) will be hidden in the final release (working learning concepts).

The screenshot displays the OPTAIN Learning Environment interface. At the top, there is a navigation bar with the OPTAIN logo and menu items: Home, Learn About, Case studies&Measures, Policies(KP), Expert & Scientific Area, and Explorative Tools. A 'Knowledge Pathway' button is visible on the right. Below the navigation bar, the main content area is divided into several sections:

- Left Sidebar:** Contains 'Pathways 17' and a list of case studies. The selected case study is 'OPTAIN : Schwarzer Schöps River Basin'.
- Main Content Area:** Displays the details for the 'OPTAIN : Schwarzer Schöps River Basin' case study. It includes a 'General' section with site information, 'Monitoring maintenance', 'Design & Implementations', 'Lessons, risks, implications...', and 'Policy, general governance and design targets'. A 'Light or in-depth? light' toggle is visible.
- Right Sidebar:** Titled 'Mobilized also in these Pathways', it lists related Knowledge Pathways and NSWORM types, such as 'Brocéliande Forest', 'Retention ponds example', and 'Sustainable Ideas and Actions'.

Figure 20: Navigation from a CS to Knowledge Pathways and related NSWORMs

The screenshot displays the OPTAIN Learning Environment interface, focusing on the structure of a Case Study. The main content area shows the details for the 'OPTAIN : Čechtický stream catchment' case study. The 'General' section is highlighted with a red box, indicating its structure:

- General:** National ID: DE_07
- Site information:** Site name: Schwarzer Schöps
- Monitoring maintenance:** Summary: The Schwarzer Schöps case study is located in the East of Germany. The catchment area is about 136 km², most of which is used as cropland (54%) and grassland (20%). The area is facing an increase in severe floods, soil erosion, and droughts, with negative implications for crop yield stability. In addition, the downstream reservoir Quidzof suffers more often from low water tables and high phosphorus pollution which is causing blue-green algae blooms and threatening its multiple services, in particular its important role for nature protection, recreation, and maintaining downstream environmental flows. The OPTAIN project will support the case study team with identifying and developing efficient land management strategies and small technical solutions to improve the soils' infiltration and water holding capacities as well as its capacity to filter, buffer and transform pollutants.
- Design & Implementations:** Project: Optain
- Lessons, risks, implications...:** Light or in-depth? light
- Policy, general governance and design targets:** The in-depth description of the case study: 1_Schwarzer_Schoeps_Poster_URZ.pdf

The right sidebar shows 'Mobilized also in these Pathways' with a list of related Knowledge Pathways and NSWORM types, such as 'Drainage filter', 'Grassing of Recharge Areas', and 'Constructed wetland with tile drainage'.

Figure 21: Structure of a Case Study

✓ Enhanced cross-links NSWORM measures, enabling users to explore relevant strategies and solutions within each case study.

The screenshot shows a case study page for 'OPTAIN: Čechtický stream catchment'. The main content area includes a 'General' section with site information, a 'Monitoring maintenance' section with a summary, and a 'Design & implementations' section. A sidebar on the right, titled 'Crosslinks', is highlighted with a red box and lists various measures under 'Proximity with NSWRM(Sections)', including 'Drainage Biofilter', 'Grassing of Recharge Areas', 'Constructed wetland with tile drainage', 'Grassed waterways', and 'Direct seeding'. Below this is a 'Learn About' section with 'Outcomes and lessons learned'.

Figure 22: Crosslink from a Case Study to NSWRM measures

✓ Enhanced connectivity to knowledge pathways, ensuring alignment with stakeholder engagement strategies and enhancing user interaction and accessibility to resources.

The screenshot shows the OPTAIN Learning Environment homepage. The top navigation bar includes 'Home', 'Learn About', 'Case studies&Measures', 'Policies(KP)', 'Tools & Scientific Tools', 'Explorative Tools', and 'Main Content'. A 'Knowledge Pathways' button is highlighted in the top right. The main content area features a 'Knowledge Pathways' grid with six categories: 'Agri-advisors', 'Civil society', 'Decision makers', 'Regional authorities', 'Scientific and academic communities', and 'Agricultural practices'. Each category has a brief description and a 'Go to Pathway' link. A sidebar on the left lists various stakeholder groups, and a sidebar on the right provides a 'Navigation Hint' and 'Crosslinks'.

Figure 23: Updated LE homepage

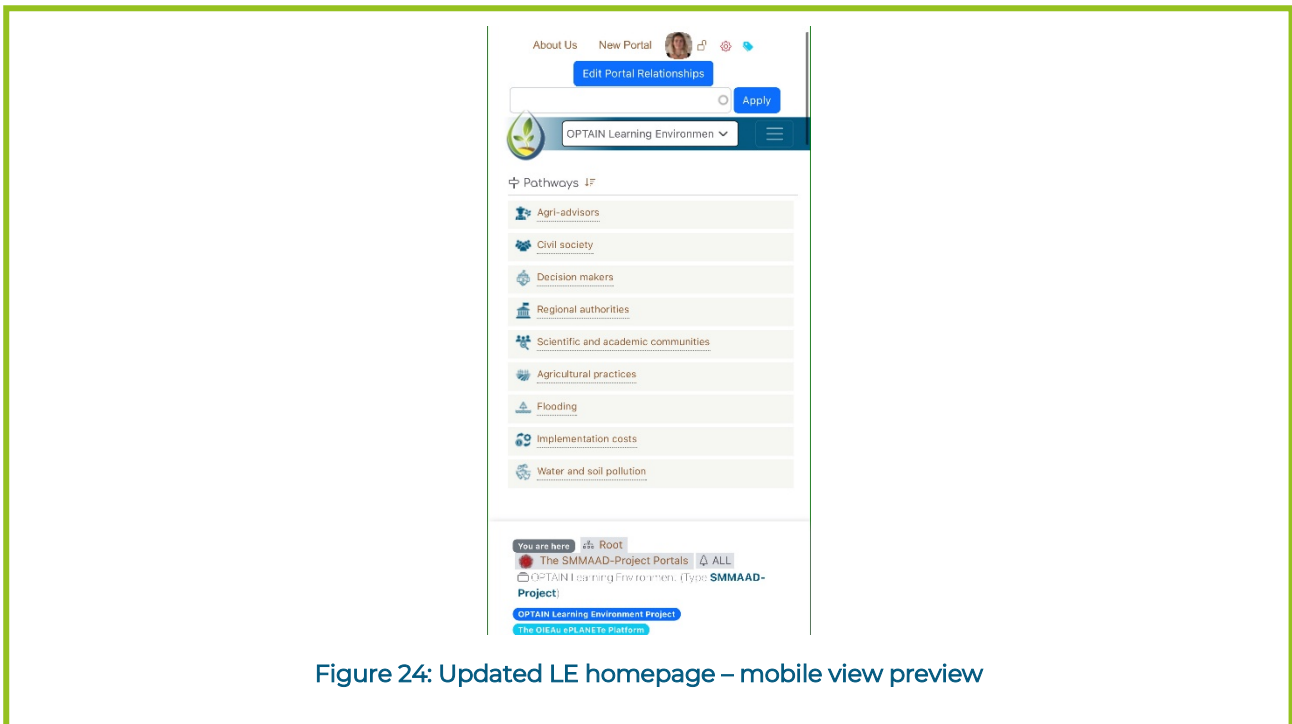


Figure 24: Updated LE homepage – mobile view preview

3.4. Filters

End users generally seek to reduce the range of possibilities when navigating through the various lists of objects provided. Filters also help to understand quickly the general structure of information provided by the website.

While this is a common approach, it often masks a certain complexity when it comes to providing a common filtering system for all parts of the site. However, this is an important feature. It also guides the different audiences to the significant and structuring entry points of the site's content, namely:

- Region,
- Case studies,
- Measures,
- Policies,
- Scenarios.

We aim to *lock* and store these filters memorized for end users, so that they only consult the content they want, until they 'release' the filtering. Also, they will retrieve this selection by filter when coming back to the website. *Essential* cookies will therefore be required to support this functionality.



Figure 25: Filters navigation

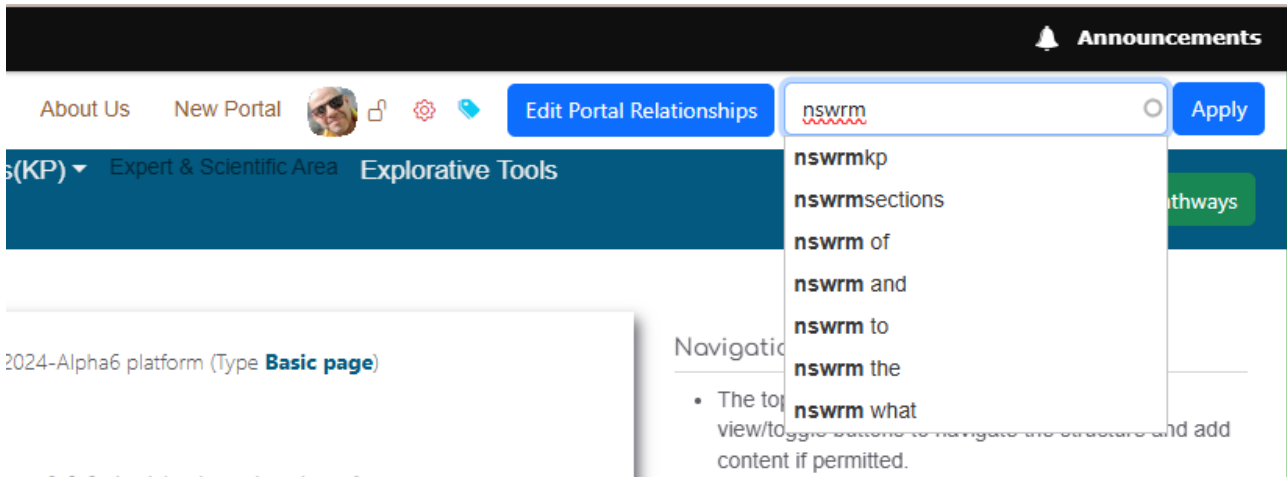


Figure 26: Preview of the search function on the page

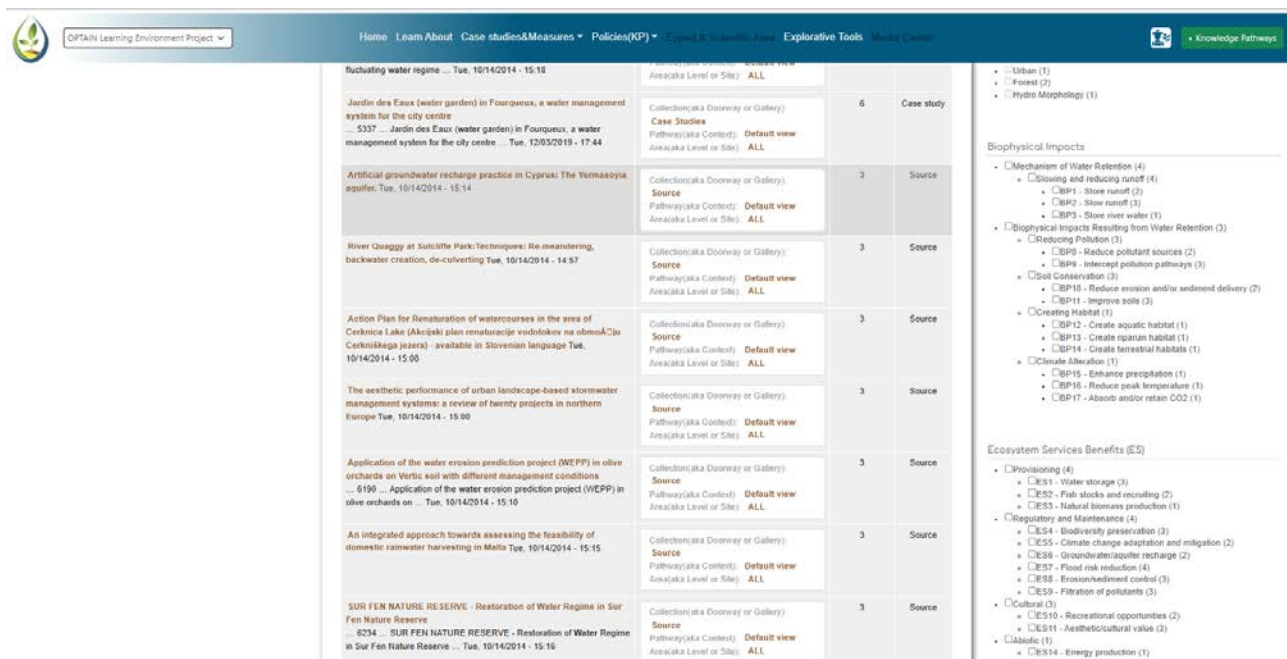


Figure 27: Filters navigation with the function search

3.5. Main Menu

The current menu navigation at the top of the screen provides direct access to the site's six main sections:

- Learn about
- Catalogue
- NSWRM Policies
- Expert & Scientific Area
 - Measure Matrix of representation (which measure have been selected for which CS)
 - SWAT+ results

- SWAP results
- Explorative Tools
 - SWAT+ results used by the optimisation
 - SWAP results used by the optimisation
 - Results of COMOLA Optimisation
 - Other results (still under construction)
- Media Center
- Legal Notice
- (Partner's platform / Login) Currently being redefined
- Choice of language
- Access to social networks
- Scrolling display and links to partners
- Site map

Progress Update of Part 2

Below is the updated menu navigation accompanied by screenshots.

- ✓ Refined main menu structure.
- ✓ Clearer categorisation of content.
- ✓ **Enhanced multilingual support**, allowing seamless switching between languages for broader accessibility.

Below the main section:

- Home
- Learn about
- Case studies & Measures– **ephemeral change of organization in this menu during this phase of development, for Partners eyes only**
 - Case Studies Exploration
 - NSWRM Catalogue
 - NSWRM (KP)
- Policies (KP) – **ephemeral change of organization in this menu during this phase of development, for Partners eyes only**
- Expert & Scientific Area
- Explorative Tools
- Media Center
- Knowledge Pathway Selector (permanent button located on the right of the header)
- Legal Notice
- (Partner's platform / Login)
- Choice of language
- Access to social networks (will be kept into the project website only: <https://www.optain.eu>)
- Scrolling display and links to partners (will be kept into the project website only: <https://www.optain.eu>)
- Site map

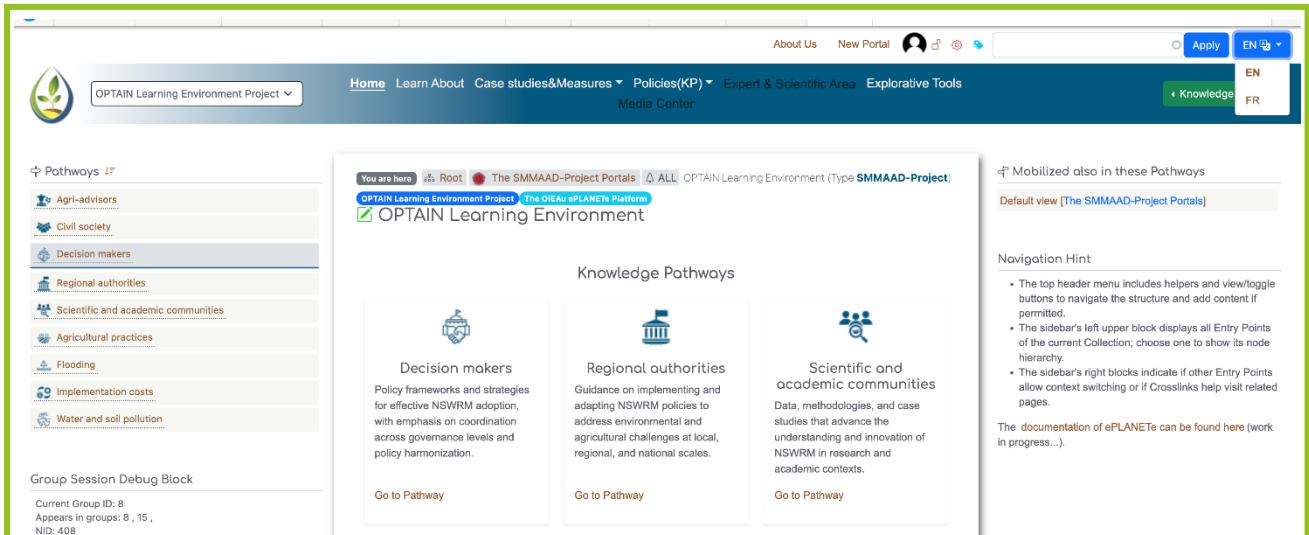


Figure 28: Function choice of language

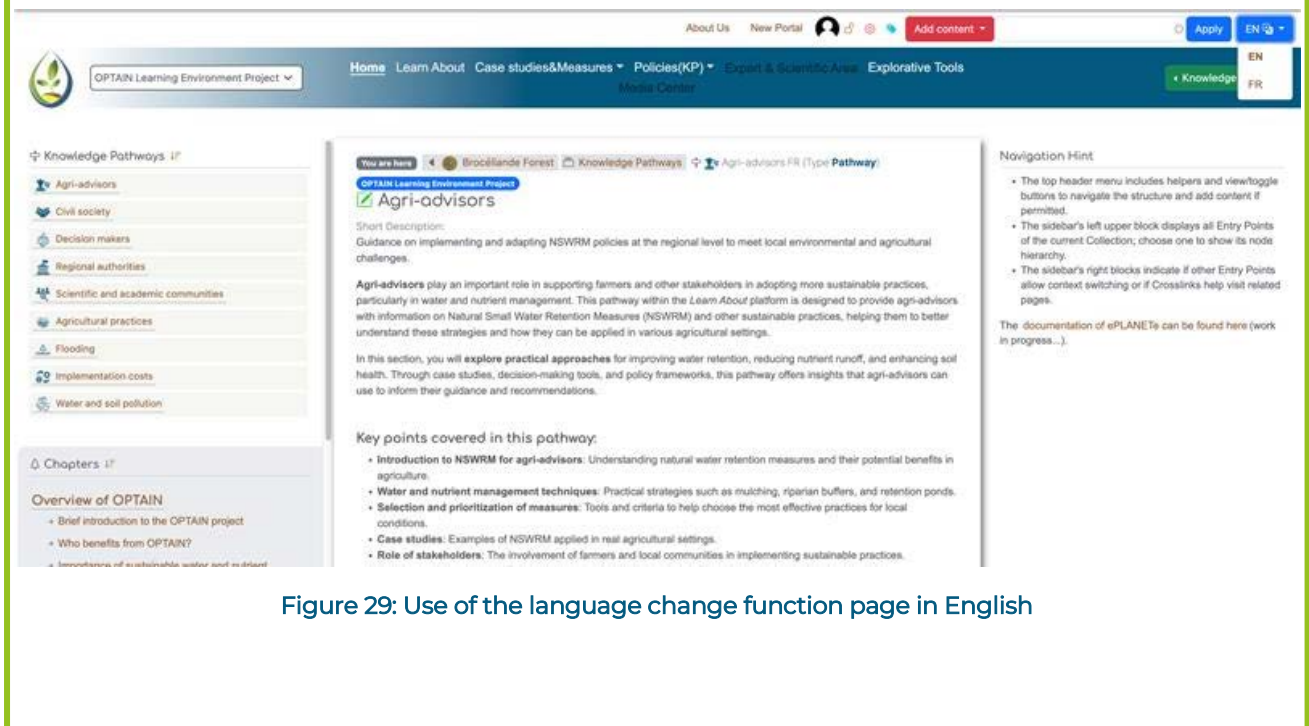


Figure 29: Use of the language change function page in English

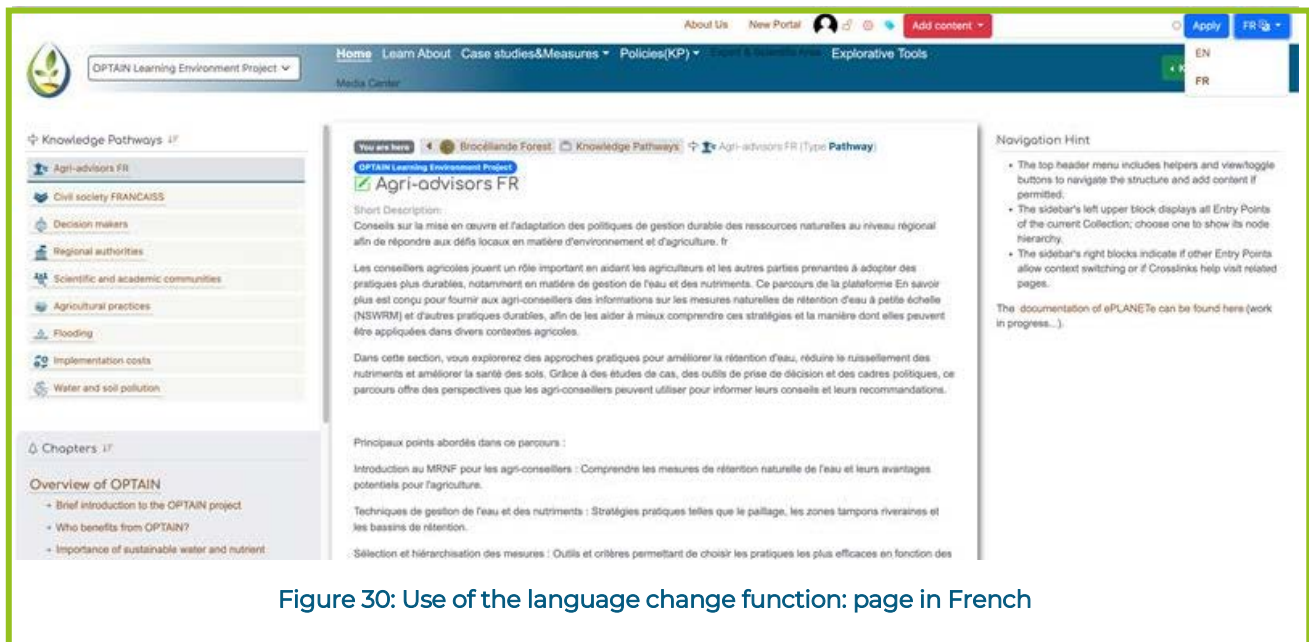
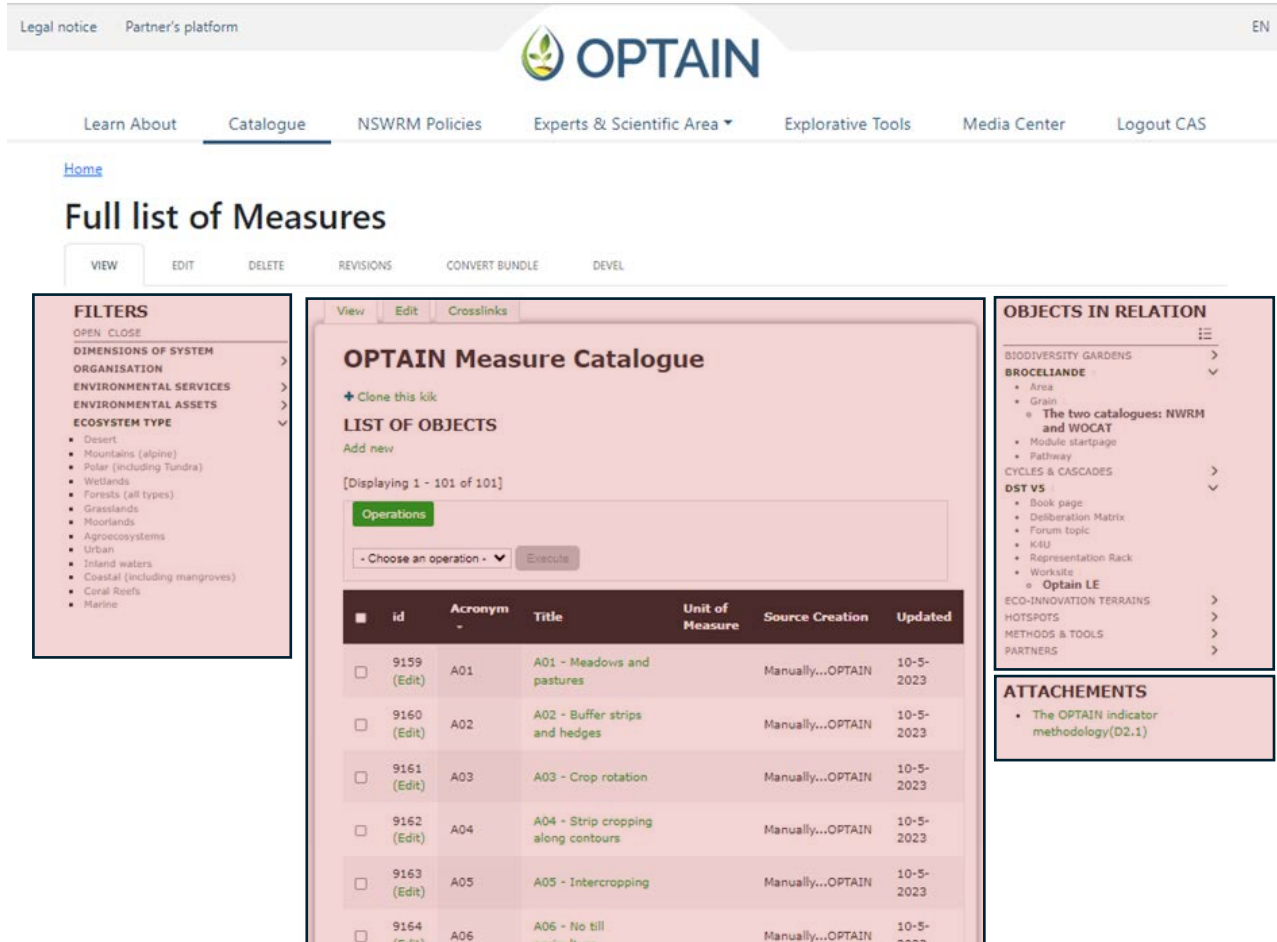


Figure 30: Use of the language change function: page in French

3.6. Catalogues

NSWRMs are the central object type in the project. There is therefore a single catalogue responsible for centralizing the NWRM and WOCAT catalogues. Other object lists are included in the site, such as policies. For the sake of consistency, and so that the user does not switch from one ergonomic logic to another, we are using an identical display layout for all the object lists, which we can generally refer to as "catalogues" (in the plural). The catalogues, and the details of the underlying objects, are displayed in triptych mode: filters on the left (or at the top; this ergonomic aspect is still under experiment), the list or details of the object in the center, and crosslink navigation (see Crosslinks navigation) with attachments on the right.

Here is an example, for the 'Catalogue' section, which provides the list of measures.



The screenshot shows the 'OPTAIN Measure Catalogue' interface. At the top, there is a navigation bar with links for 'Learn About', 'Catalogue', 'NSWRM Policies', 'Experts & Scientific Area', 'Explorative Tools', 'Media Center', and 'Logout CAS'. Below this, the main heading is 'Full list of Measures'. A secondary navigation bar includes 'VIEW', 'EDIT', 'DELETE', 'REVISIONS', 'CONVERT BUNDLE', and 'DEVEL'. The interface is divided into three main sections:

- Left side box (FILTERS):** Contains a tree view of filters including 'OPEN CLOSE', 'DIMENSIONS OF SYSTEM', 'ORGANISATION', 'ENVIRONMENTAL SERVICES', 'ENVIRONMENTAL ASSETS', and 'ECOSYSTEM TYPE' with sub-items like Desert, Mountains, Polar, Wetlands, Forests, Grasslands, Moorlands, Agroecosystems, Urban, Inland waters, Coastal, Cereal/Roofs, and Marine.
- Centre box (LIST OF OBJECTS):** Displays a table of objects with columns for 'id', 'Acronym', 'Title', 'Unit of Measure', 'Source Creation', and 'Updated'. The table shows six rows of data, each with an 'Operations' button and an 'Execute' button.
- Box upper right (OBJECTS IN RELATION):** Shows a list of related objects, including 'BIODIVERSITY GARDENS', 'BROCELIANDE', 'CYCLES & CASCADES', 'DST V5', 'ECO-INNOVATION TERRAINS', 'HOTSPOTS', 'METHODS & TOOLS', and 'PARTNERS'.
- Box lower right (ATTACHEMENTS):** Shows a list of attachments, including 'The OPTAIN indicator methodology(D2.1)'.

Figure 31: Catalogue navigation

Explanation:

- Left side box: placeholder of the Filters (we aim to group horizontal and left side filters on one place only and make them freezable),
- Centre box: placeholder of the list of objects, or the detail of one object,
- Box upper right: placeholder of the crosslinks,
- Box lower right: placeholder of the attachment.

3.7. Crosslinks

This navigation mode allows a transversal experience. Each object of the website may have a motivated relationship with others. With the «crosslinks» navigation system, placed on the right side, we can *jump* from an object to another.

In figure 20, the object in relation part (on the right) shows examples of Crosslinks (displayed in bold, grouped by Gallery).

Please note: The names of the Galleries displayed in the "OBJECTS IN RELATION" content block are the conceptual names of the ePLANETe platform. This display is temporary, and specific to the prototype version.

3.8. Media center

The Media Center is a central repository where all documents associated with the LE content can be stored. The current document available through the OPTAIN website will be moved in the same repository.

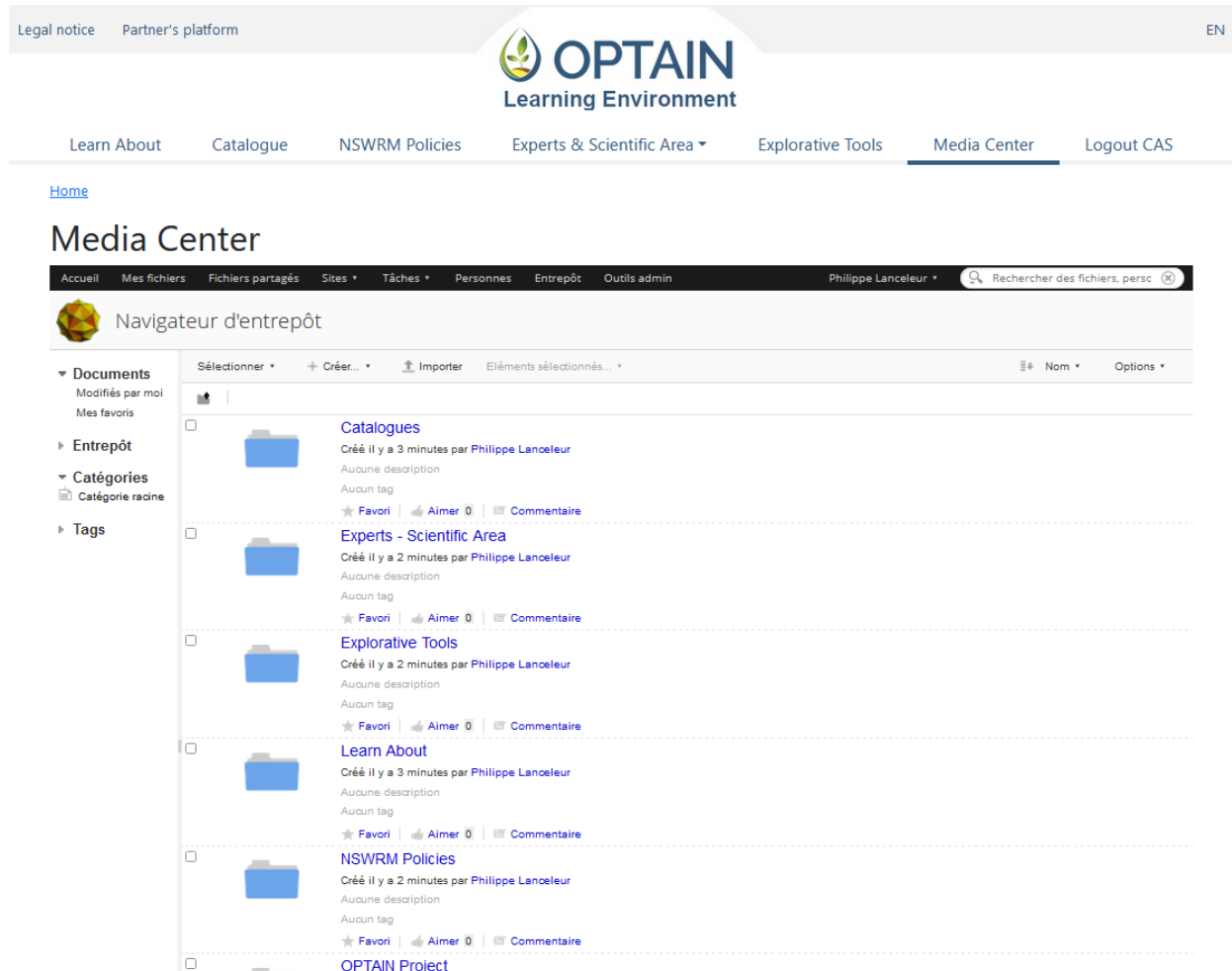


Figure 32: Media center navigation

3.9. Search

The search engine form that is being targeted would be as simple as a single text box, similar to the Google search system. It would provide a one stop shop for all the content put into the LE. The search results are presented by:

- LE page,
- Objects in the underlying ePLANETe Galleries and catalogues,
- Documents and references found in the "Media Center" section.

This navigation mode is not yet available in the prototype version.

4. Presentation of the first online version: main sections

The illustrations in this section follow the order of the main menu of LE, starting from the left. The illustrations shown here are not the final versions. They are prototypical versions that are being built at this stage to bring together the main structural elements.

4.1. Learn about

The Learn About section is an iFrame in the Learning Resources Gallery. It offers a range of learning pathways, enabling different audiences to explore knowledge about NSWRMs from different angles: concepts, methods, case studies, and modelling. Each "learning pathway" offers learning areas in a particular order.

The illustrations below show the introduction of a 'learning pathway', as well as a grain of knowledge at the center, and with its crosslinks at the right side.

A grain of knowledge can be used in several learning pathways, so the user can navigate from one learning pathway to another from within the grain itself. They can also navigate to other objects on the site (see "Proximity With" and object "OPTAIN Measure Catalogue" in the illustration below).

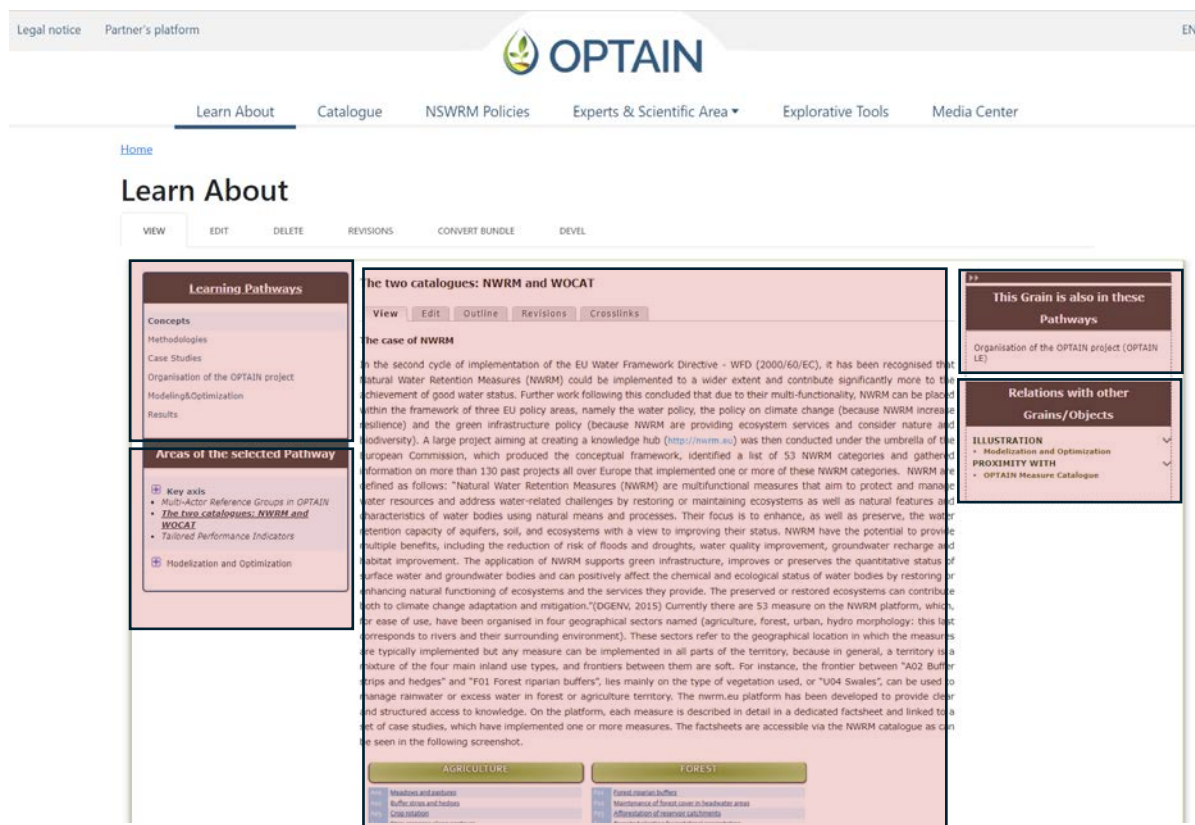



Figure 33: Learning pathways with crosslinks

Box upper left: Learning pathways. Box lower left: Areas of the current learning pathway. Centre box: Content of the learning pathway, area or grain of knowledge. Box upper right: Other learning pathways where current grain could also be present. Box lower right: Crosslinks categorizes by types (Relations with other Grain/Objects). Optionally, another box with attachments may appear below.

On one hand, the Learning pathways, grains, crosslinks are pedagogic contents built from the knowledge on NSWORMs delivered by the project. On the other hand, it directly benefits from the stakeholders' feedbacks through the MARG process as well as from the results of the scenarios, modelling and optimisation. The illustration above and beside have a demonstration purpose but do not necessarily reflect the visualization that will be presented in the last version of the LE.



The screenshot shows the OPTAIN Learning Environment interface. At the top, there is a navigation bar with 'Legal notice', 'Partner's platform', and 'EN'. Below this is the OPTAIN Learning Environment logo. The main navigation includes 'Learn About', 'Catalogue', 'NSWRM Policies', 'Experts & Scientific Area', 'Explorative Tools', 'Media Center', and 'Logout CAS'. The 'Learn About' section is active, showing a 'VIEW' button and a list of actions: 'EDIT', 'DELETE', 'REVISIONS', 'CONVERT BUNDLE', and 'TRANSLATE'. The 'Learning Pathways' sidebar on the left includes 'Concepts', 'Methodologies', 'Case Studies', 'Organisation of the OPTAIN project', 'Modeling & Optimization', and 'Results'. The 'Areas of the selected Pathway' section shows 'Modelization and Optimization' and 'Workflow'. The main content area displays a 'Methodologies' diagram with a 'View' button and 'Edit', 'Outline', 'Crosslinks' options. The diagram illustrates a workflow from 'WP2, task 2.1 - Case Studies & measures' through 'WP2, task 2.3 Parameters/ Parametrisation' to 'WP4 S.W.A.T.', and then to 'WP5 - COMOLA - optimization tool'. A text box explains that 'Case Study Specific Indicators = issues/parameters that have a meaning for the stakeholders when talking about effects of measures'. A video player on the right shows a man speaking, with a progress bar at 0:00 / 0:55. Below the diagram, a caption reads: 'The methodology followed to outline the customized sets of PIs was based upon two complementary strands: (i) the contribution of scientific partners' expertise to list all the potential or candidate indicators, and (ii) a participative approach that involved the local research teams and stakeholders, enforcing the relationships and the knowledge sharing between academia and science and the real-world operators.'

Figure 34: Text and Video animation

Progress Update of Part 2

Below is the updated of "Learn about" section, accompanied by screenshots.

- ✓ **Structured pathways introduced** – The "Learn About" section has evolved into a dedicated resource hub with thematic pathways, offering structured guidance on NSWORM concepts, methodologies, tools and resources, case studies and interactive session.
- ✓ **Integrated multimedia learning** – A video for a comprehensive overview of the OPTAIN project, highlighting its goals, innovative approaches, and commitment to sustainable water and nutrient management.
- ✓ **Improved navigation** – The section now features a left-side menu with clearly categorised section pathways.

- ✓ **Enhanced crosslinking** – Each learning module is now linked to case studies, training materials, events, quiz methodologies, policy frameworks, etc.
- ✓ **Partner feedback incorporated** – The content has been refined based on partner feedback, making the section more interactive for different target audiences.
- ✓ **Interactive knowledge assessment** – Each section now includes two quizzes: one to test prior knowledge on the topic and a final quiz to assess overall comprehension of the module.
- ✓ **Illustrated thematic question sheets** – A set of 19 thematic question sheets has been created, providing key insights into project-related topics in an engaging, illustrated format. These sheets are structured as questions and cover three main areas: 7 key questions on NSWRM, 7 questions on the implementation and optimization of NSWRM, and 5 questions on the monitoring and evaluation of NSWRM.

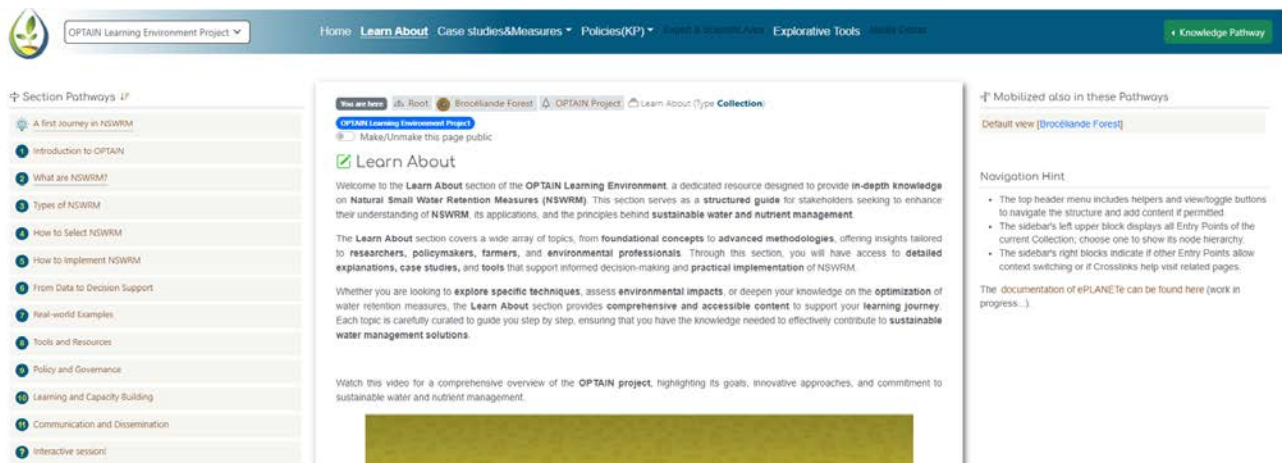


Figure 35: Updated learning pathways with crosslinks

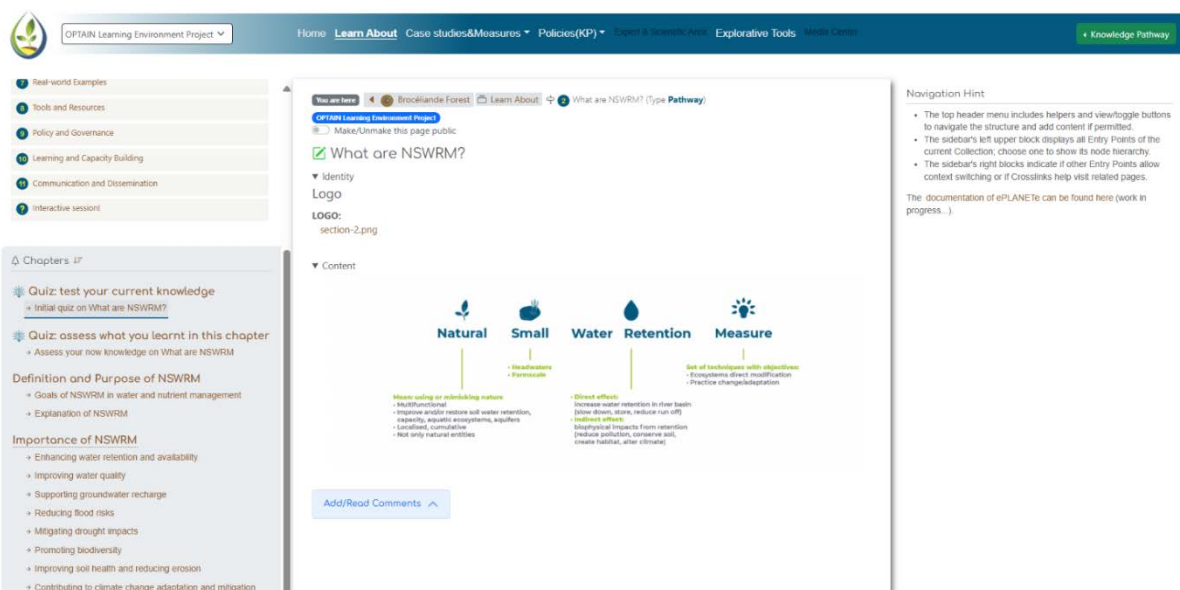


Figure 36: Example of learning pathways “What are NSWRM?”

The screenshot shows a web page titled "Enhancing water retention and availability" under the "Brooklands Forest" collection. The page is part of a "Knowledge Pathway" and includes a sidebar on the left with a list of chapters and quizzes. The main content area contains sections for "Content", "Objective", and "Details". The sidebar on the left lists various topics such as "How to Select NSWRM", "How to Implement NSWRM", and "Real-world Examples". A "Quiz: test your current knowledge" is highlighted in the sidebar. The right sidebar shows "Crosslinks" and "Proximity with Case Studies".

Figure 37: Example of knowledge pathways with cross-links to NSWRM on the left.

The screenshot shows a quiz page titled "1. Initial quiz on introduction to OPTAIN". The page is part of a "Knowledge Pathway" and includes a sidebar on the left with a list of section pathways. The main content area contains a question: "1. What is the main objective of the OPTAIN project?". The answer options are: a) To promote urban development, b) To enhance sustainable water and nutrient management, c) To increase industrial production, and d) To reduce air pollution. The "b" option is selected. The right sidebar shows a "Navigation Hint" section.

The screenshot shows a section pathway page titled "Introduction to OPTAIN". The page is part of a "Knowledge Pathway" and includes a sidebar on the left with a list of section pathways. The main content area contains a section titled "Initial quiz on Introduction to OPTAIN". The right sidebar shows a "Navigation Hint" section.

Figure 38: Example of interactive quizzes available in each section: a preliminary quiz to test prior knowledge and a final quiz to assess overall understanding of the module.

The screenshot shows the OPTAIN Learning Environment Project interface. The main content area features a large blue graphic with the text "OPTAIN General questions on the Learn About" and "19 QUESTIONS". Below this, there are three bullet points: "7 Key questions on NSWRM", "7 questions on Implementation and Optimization of NSWRM", and "5 questions on Monitoring and Evaluation of NSWRM". Social media handles for @H2020_OPTAIN and @H2020OPTAIN are also visible.

Figure 39: Menu of thematic question sheets covering key aspects of NSWRM.

The screenshot displays a detailed thematic question sheet titled "What are Natural Small Water Retention Measures?". It includes a definition, examples of NSWRM (Retention Ponds, Mulching, Wetland Restoration), and a section on "Benefits of NSWRM" which lists: Flood Mitigation (NSWRM can reduce the risk of local floods by 30%), Drought Resilience, Water Quality Improvement (Up to 25% of pollutants can be naturally filtered through these systems), Biodiversity Support, and Soil Conservation (Soil conservation practices can reduce soil erosion by up to 50%). An "Implementation in Practice" section describes a scenario in a sloped agricultural area with erosion and runoff issues, where terraces and riparian buffers are used to manage water.

Figure 40: Example of an illustrated thematic question sheet on NSWRM

4.2. Catalogue

The NSWRM catalogue combines data from the NWRM.eu and WOCAT catalogues.

The module for retrieving information from the two catalogues has already been produced. However, work on consolidating and presenting the metadata is still in progress. For now, the illustration below shows the targeted general layout of the list of measures.

The full list of fields that composed a detailed measure and Case Study is still under construction and dependent on the inputs from other WPs.

Progress Update of Part 2

Below the latest updates:

✓ **NSWRM catalogue structured** and linked to “Case Studies and Measures” section for easy cross-referencing.

- *Left Panel (Filters): Displays a list of filtering options, allowing users to refine searches efficiently.*
- *Central Panel: Serves as the main content area.*
- *Upper-Right Panel (Crosslinks): Connects to related NSWRM measures, case studies, and pathways.*

✓ **Interactive visualization map integrated**, allowing users to explore NSWRM measures in relation to specific case study locations.

✓ **CS team feedback incorporated**, ensuring the catalogue aligns with each CS, user needs and enhances accessibility.

✓ **Optimised filter functionality**, improving search efficiency with a unified, freezable filtering system.

Below the updated figure of the NSWRM catalogue page:

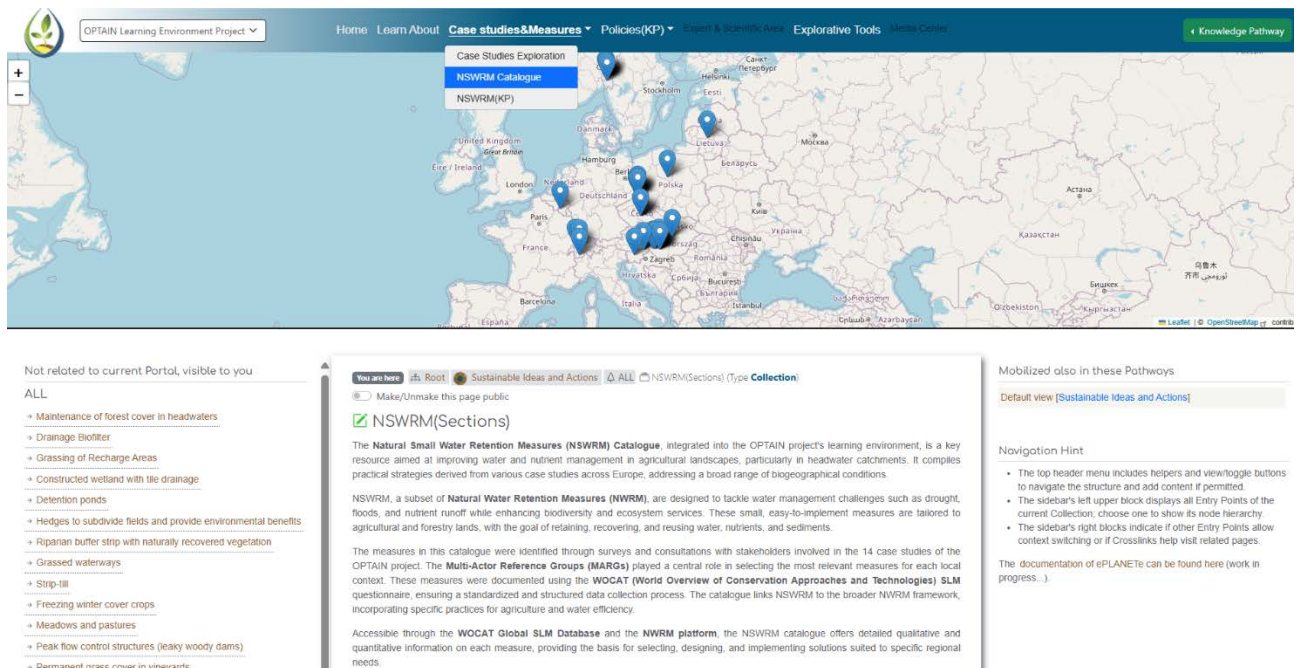


Figure 41: Updated Catalogue navigation

Below the updated figure of an example of measure related to a CS:

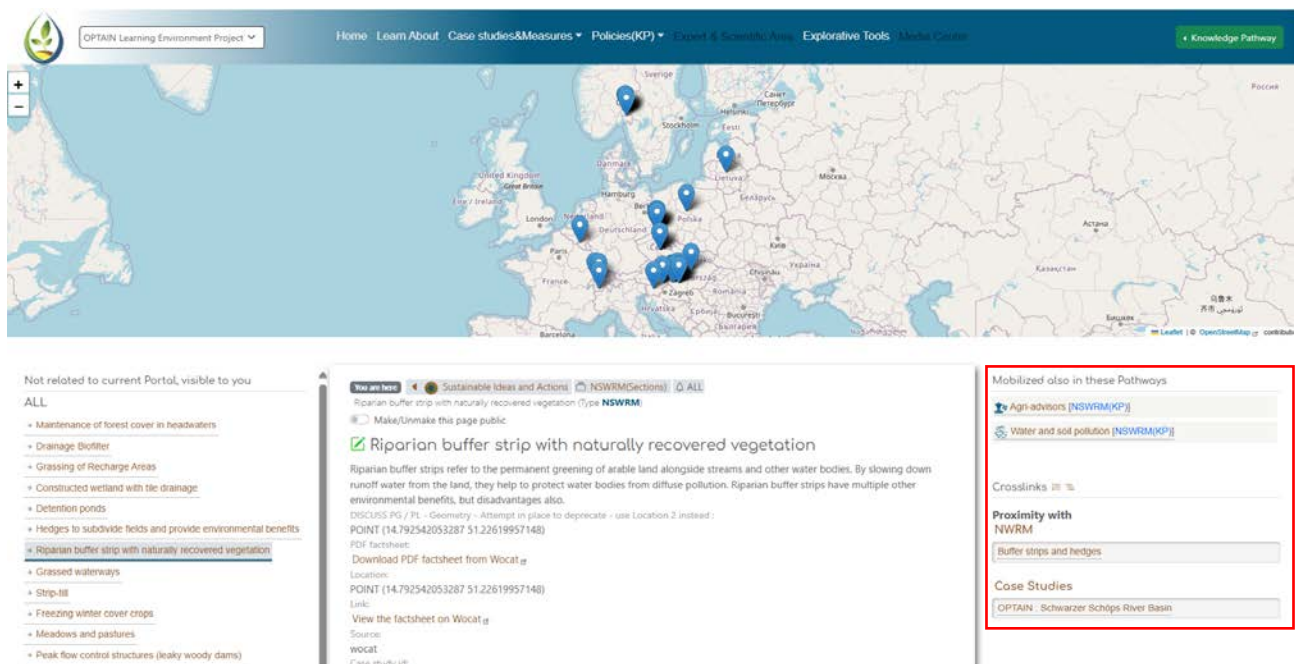


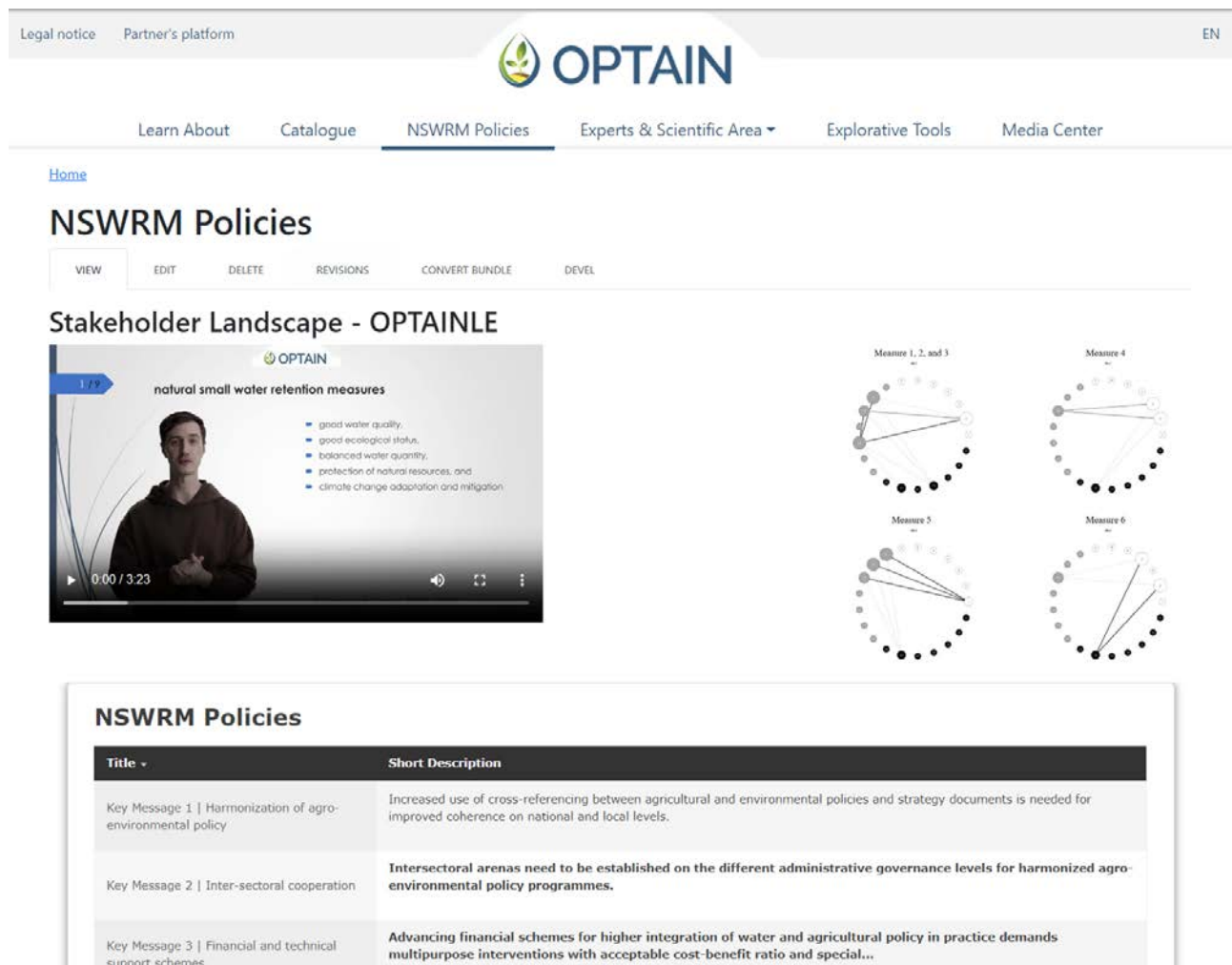
Figure 42: Example of catalogue measure navigation

4.3. NSWRM Policies

At that stage of development, the "NSWRM Policies" contains three types of data:

- video presentation
- Stakeholder map
- catalogue of key messages

Additional types of information are already planned. For example, policy recommendations will be added as WP6 is working on dedicated policy factsheet at the scale of the CS. To ensure an end user approach, it is also considered to adapt the navigation mode so farmers will be guided to find relevant policy information on the measures.



Title	Short Description
Key Message 1 Harmonization of agro-environmental policy	Increased use of cross-referencing between agricultural and environmental policies and strategy documents is needed for improved coherence on national and local levels.
Key Message 2 Inter-sectoral cooperation	Intersectoral arenas need to be established on the different administrative governance levels for harmonized agro-environmental policy programmes.
Key Message 3 Financial and technical support schemes	Advancing financial schemes for higher integration of water and agricultural policy in practice demands multipurpose interventions with acceptable cost-benefit ratio and special...

Figure 43: NSWRM Policies

Progress Update of Part 2

Below is the updated of “Learn about” section, accompanied by screenshots.

✓ **Enhanced user and thematic navigation** – Instead of a generic policy section, the updated version now includes well-defined and clear policy pathways, categorised by themes as NSWRM policy implementation at national/regional levels, harmonization, and stakeholder engagement.

✓ **Improved crosslinking** – The policies are now linked, depending on the content, to related topics.

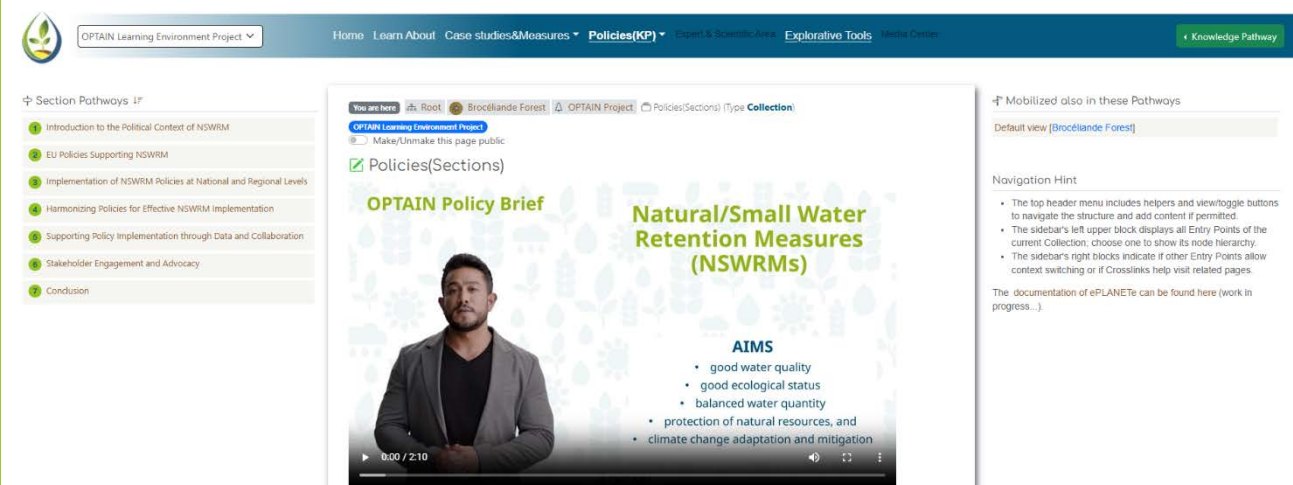


Figure 44: Updated NSWRM Policies section

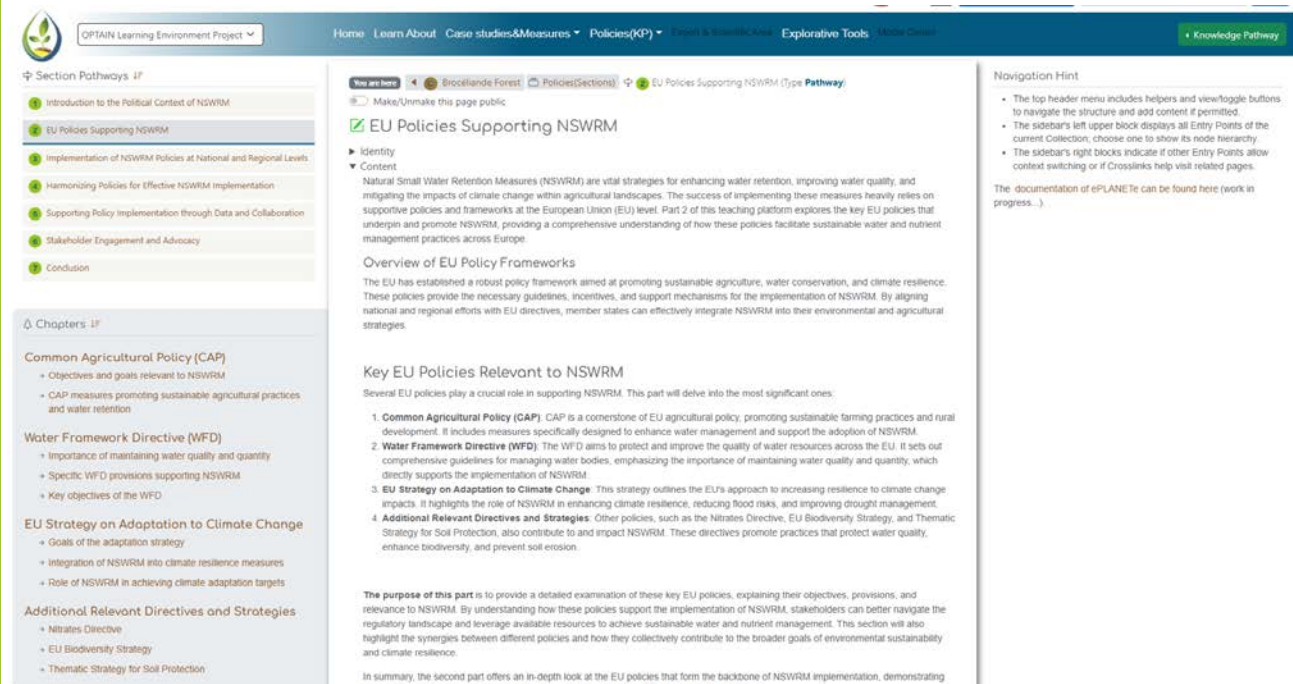


Figure 45: Example of EU Policies Supporting NSWRM page

4.4. Expert and Scientific Area

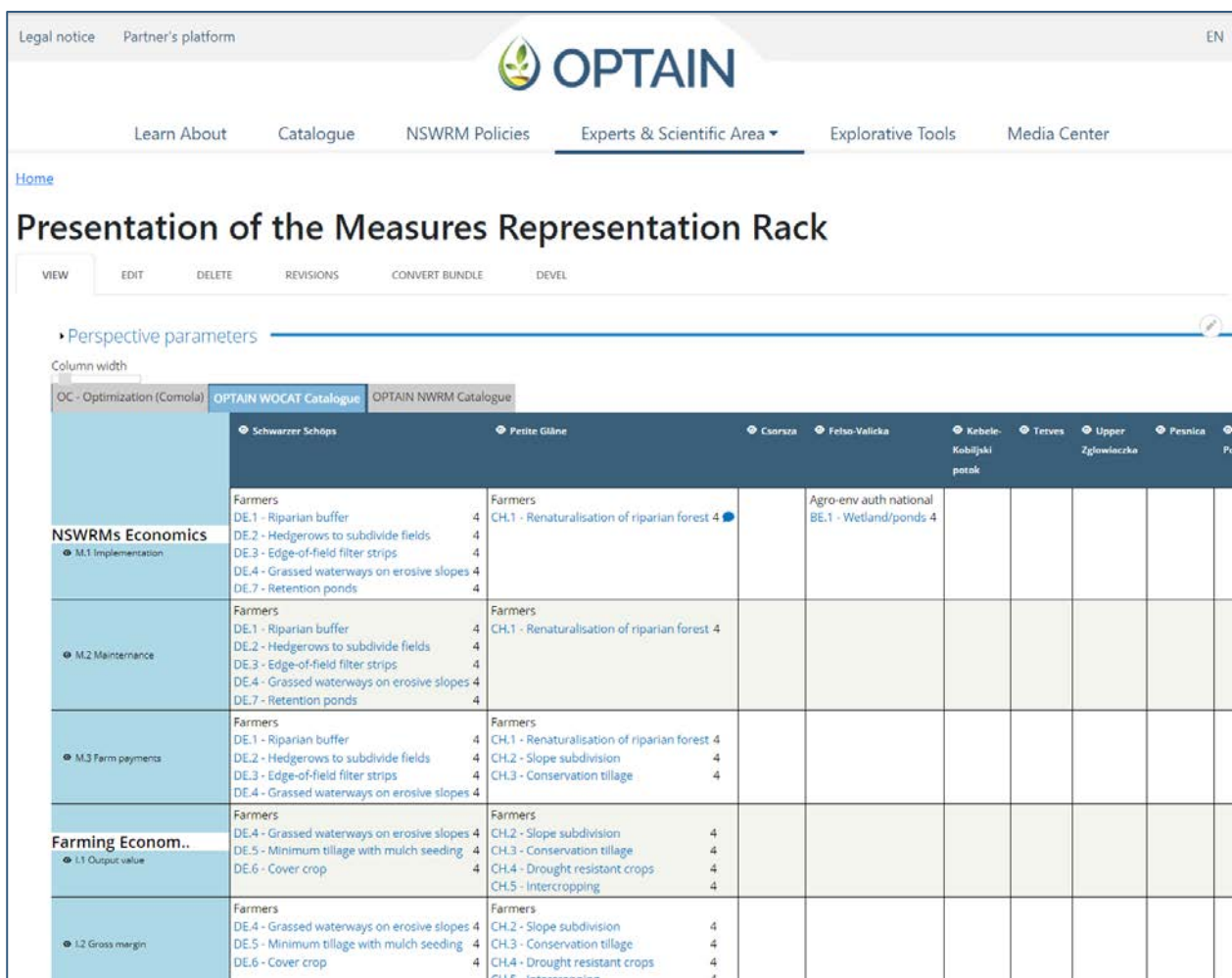
This area aims to gather the scientific content related to the development of the scenarios, modelling and optimisation. This area is targeting the expert audience dealing with NSWRM and willing to dig into the scientific details related to the understanding and implementation of the measures as well as getting the scientific background of the tools developed by OPTAIN.

At that stage of development, the area proposes a way to represent a full matrix of the NSWRM final selection, for each CS.

In columns, we get the CSs. In rows, we have the SPI indicators (top categories, and subcategories). This row organization focuses on the *what* would be modelled as well as optimized (see deliverable D2.2) by using the COMOLA optimisation framework.

Furthermore, there are two tabs that split the origin of the measure: one for WOCAT and one for NWRM.eu. In each cell, we see the final NSWRM selection (no more than seven) as required. The illustration below shows the general idea. Only two CS have been fully filled.

For each CS, some measures have been targeted as relevant (computable).



		OPTAIN WOCAT Catalogue		OPTAIN NWRM Catalogue						
		Schwarzer Schöps	Petite Glâne	Corsza	Felső-Valleika	Kebele-Kobilyjski potok	Tervez	Upper Zgornelacznka	Pesnica	
NSWRMs Economics	M.1 Implementation	Farmers DE.1 - Riparian buffer 4 DE.2 - Hedgerows to subdivide fields 4 DE.3 - Edge-of-field filter strips 4 DE.4 - Grassed waterways on erosive slopes 4 DE.7 - Retention ponds 4	Farmers CH.1 - Renaturalisation of riparian forest 4		Agro-env auth national BE.1 - Wetland/ponds 4					
	M.2 Maintenance	Farmers DE.1 - Riparian buffer 4 DE.2 - Hedgerows to subdivide fields 4 DE.3 - Edge-of-field filter strips 4 DE.4 - Grassed waterways on erosive slopes 4 DE.7 - Retention ponds 4	Farmers CH.1 - Renaturalisation of riparian forest 4							
	M.3 Farm payments	Farmers DE.1 - Riparian buffer 4 DE.2 - Hedgerows to subdivide fields 4 DE.3 - Edge-of-field filter strips 4 DE.4 - Grassed waterways on erosive slopes 4	Farmers CH.1 - Renaturalisation of riparian forest 4 CH.2 - Slope subdivision 4 CH.3 - Conservation tillage 4							
	Farming Econom..	L.1 Output value	Farmers DE.4 - Grassed waterways on erosive slopes 4 DE.5 - Minimum tillage with mulch seeding 4 DE.6 - Cover crop 4	Farmers CH.2 - Slope subdivision 4 CH.3 - Conservation tillage 4 CH.4 - Drought resistant crops 4 CH.5 - Intercropping 4						
		L.2 Gross margin	Farmers DE.4 - Grassed waterways on erosive slopes 4 DE.5 - Minimum tillage with mulch seeding 4 DE.6 - Cover crop 4	Farmers CH.2 - Slope subdivision 4 CH.3 - Conservation tillage 4 CH.4 - Drought resistant crops 4 CH.5 - Intercropping 4						

Figure 46: Measures representation rack by catalogue origin

A third tab, *OC – Optimisation (Comola)*, represents which final performance indicators have been chosen for the COMOLA optimisation framework, by each CS. Please see the illustration below:

The screenshot shows a web interface for 'OPTAIN Learning Environment'. The main heading is 'Presentation of the Measures Representation Rack'. Below this is a table with columns for different CSs and rows for various measures and performance indicators. The table is titled 'Perspective parameters' and includes a 'Column width' dropdown. The table has a header row for 'OC - Optimization (Comola)' and sub-headers for 'OPTAIN WOCAT Catalogue' and 'OPTAIN NWRM Catalogue'. The CSs listed are: Schwarzer Schöps, Petite Glâne, Csorza, Felső-Valicska, Kebele-Kobiljski potok, Tetves, Upper Zgłowaczka, Pesnica, Kobilski Potok, La Wimbe, and Dotnuvele. The measures listed are: NSWRMs Economics (M.1 Implementation, M.2 Maintenance, M.3 Farm payments), Farming Econom.. (I.1 Output value, I.2 Gross margin, I.3 Factor productivity in agriculture, I.4 Gross value added, I.5 Land use intensity, I.6 Total landscape economic score), Quality of lan.. (I.7 Soil, I.8 Water quality improvement, I.13 Value of carbon sequestration, I.14 Value of avoided CO2 emissions), and Quality of lif.. (I.9 Increased/decreased environmental, I.10 Increased/decreased vulnerability, I.11 Value of reduced flood damage and hazard). The table shows 'Farmers' as the expert group for most measures, and 'OO - Implementation cost 4', 'OO - Gross margin 4', 'OO - Nitrate 4', and 'OO - Water flow 4' as the performance indicators.

Measure	Schwarzer Schöps	Petite Glâne	Csorza	Felső-Valicska	Kebele-Kobiljski potok	Tetves	Upper Zgłowaczka	Pesnica	Kobilski Potok	La Wimbe	Dotnuvele	Cherio
NSWRMs Economics	Farmers											
• M.1 Implementation	OO - Implementation cost 4											
• M.2 Maintenance												
• M.3 Farm payments												
Farming Econom..												
• I.1 Output value												
• I.2 Gross margin	Farmers OO - Gross margin 4											
• I.3 Factor productivity in agriculture												
• I.4 Gross value added												
• I.5 Land use intensity												
• I.6 Total landscape economic score												
Quality of lan..	Farmers											
• I.7 Soil	OO - Nitrate 4											
• I.8 Water quality improvement												
• I.13 Value of carbon sequestration												
• I.14 Value of avoided CO2 emissions												
Quality of lif..												
• I.9 Increased/decreased environmental												
• I.10 Increased/decreased vulnerability												
• I.11 Value of reduced flood damage and hazard	Farmers OO - Water flow 4											

Figure 47- Representation rack of performance indicator used in Comola optimisation

The figure above provides a transcription of the work delivered by UMIL¹⁶ that links the measures, the SPI indicators, the CS with the two sources of information (WOCAT and NWRM.eu).

This matrix representation has three dimensions. A fourth one exists that allows to represent which expert group provided the information. Here for illustration, we see the “Farmers” mention in each cell, that is the expert group that either provided the measure selection, or the performance indicator.

Another experimental view or representation of the COMOLA optimisation would be with spider diagrams using likert scales. It would help to compare CSs combining

¹⁶ Internal working document OPTAIN LE_SPIs-WOCAT correspondence.xlsx created by Federica Monaco (UMIL, WP2)

qualitative and quantitative indicator values in a common standard. The illustration below does NOT represent some existing values. It is just for illustration.

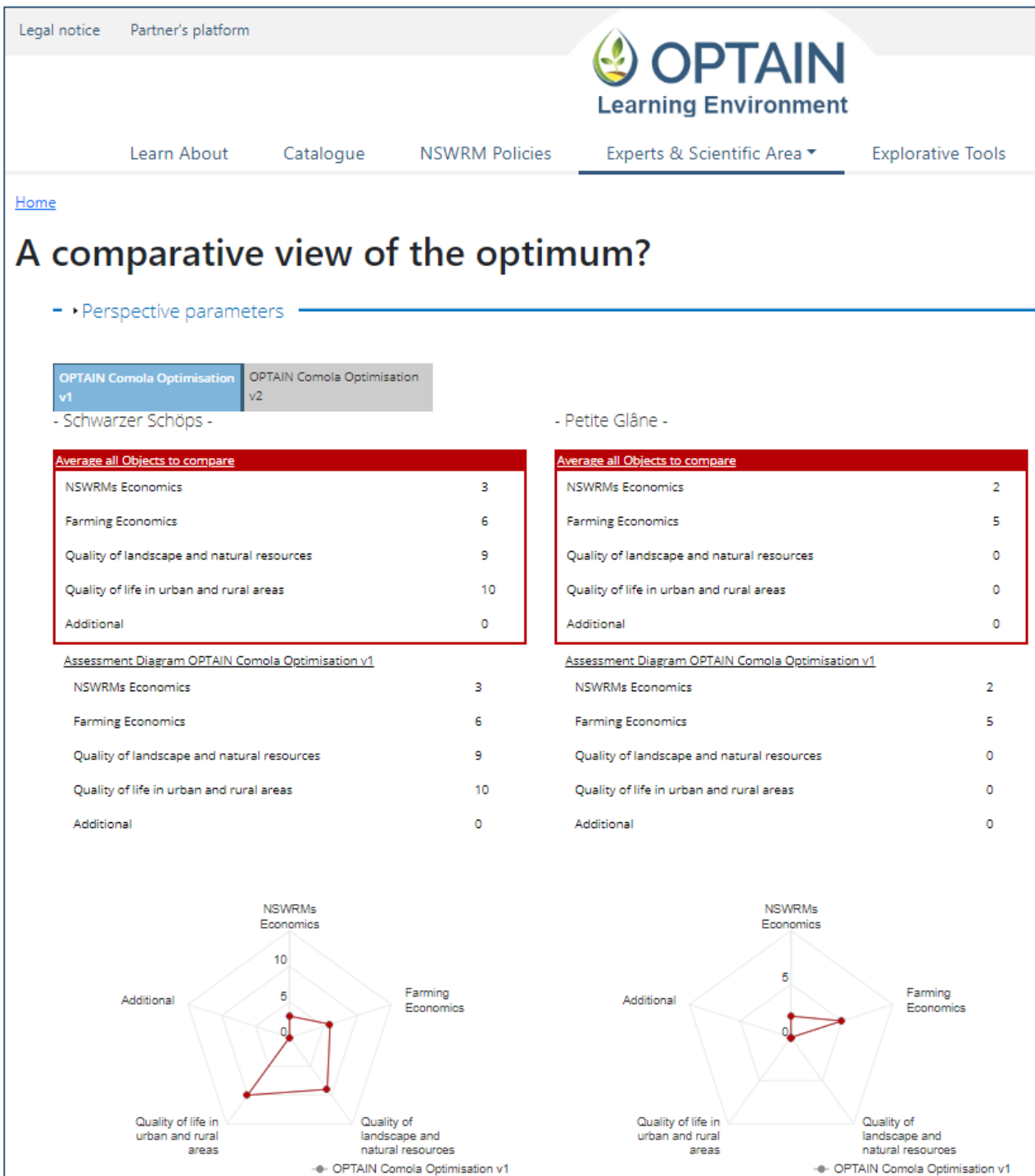


Figure 48: Comparative experiment of some Comola optimum, by CS

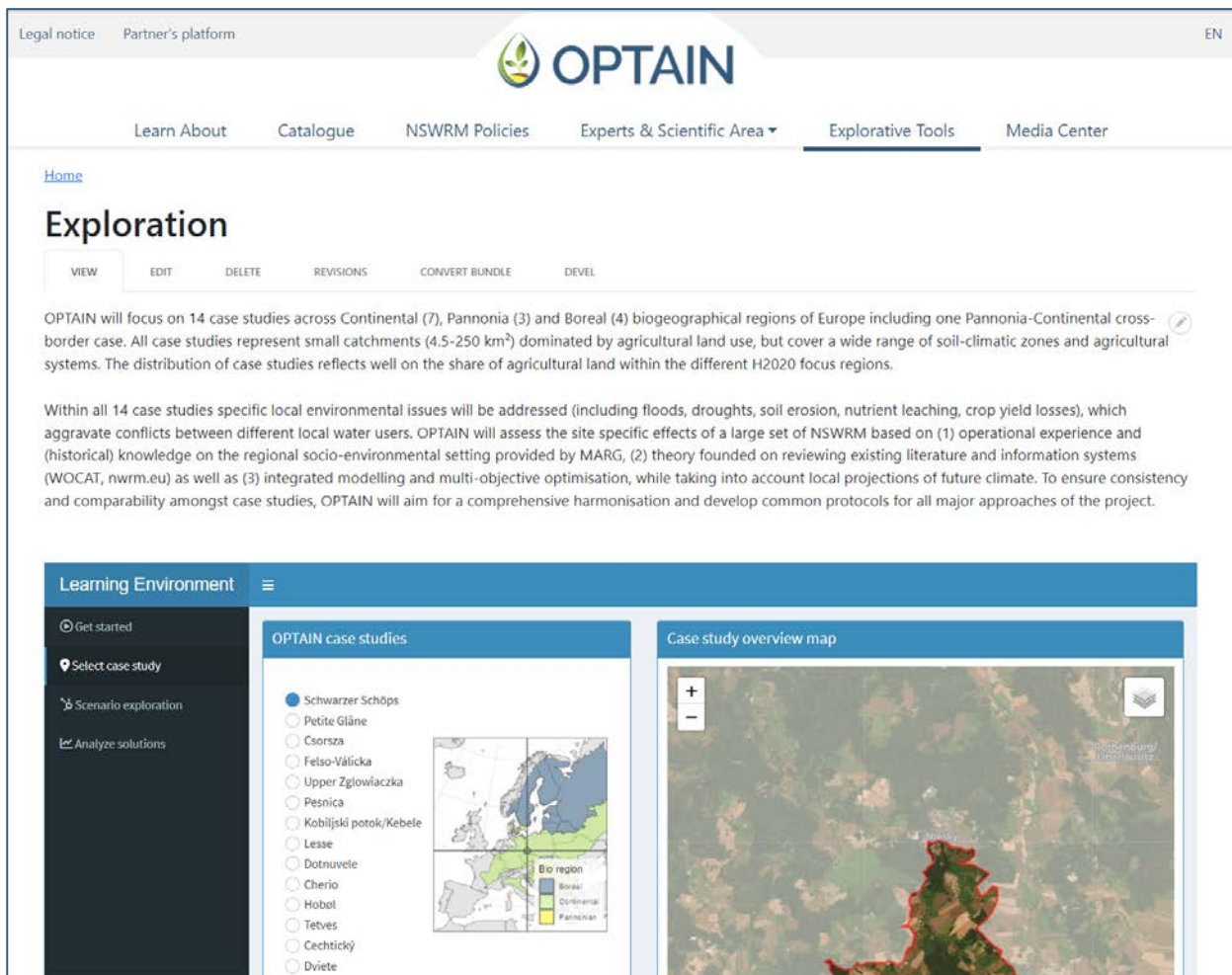
Progress Update of Part 2

The **Scientific and Expert Area** section is not yet available as it is currently under development. This explains why the menu appears greyed out. The section will be implemented soon.


4.5. Explorative Tools

In addition to the cartography of the NSWRM and CS, an interactive tool in RShiny language will be available to explore the detailed results of the COMOLA optimization for each of the 14 case studies

The optimisation is using four performance indicators (two SPIs and two environmental) as objective functions. Moving the cursors help end users to see the different pareto optimum solutions at the field and catchment scale. For example, changing one indicator value may impact all three others (trade-offs).



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Learn About Catalogue NSWRM Policies Experts & Scientific Area **Explorative Tools** Media Center

[Home](#)

Exploration

VIEW EDIT DELETE REVISIONS CONVERT BUNDLE DEVEL

OPTAIN will focus on 14 case studies across Continental (7), Pannonia (3) and Boreal (4) biogeographical regions of Europe including one Pannonia-Continental cross-border case. All case studies represent small catchments (4.5-250 km²) dominated by agricultural land use, but cover a wide range of soil-climatic zones and agricultural systems. The distribution of case studies reflects well on the share of agricultural land within the different H2020 focus regions.


Within all 14 case studies specific local environmental issues will be addressed (including floods, droughts, soil erosion, nutrient leaching, crop yield losses), which aggravate conflicts between different local water users. OPTAIN will assess the site specific effects of a large set of NSWRM based on (1) operational experience and (historical) knowledge on the regional socio-environmental setting provided by MARG, (2) theory founded on reviewing existing literature and information systems (WOCAT, nwrn.eu) as well as (3) integrated modelling and multi-objective optimisation, while taking into account local projections of future climate. To ensure consistency and comparability amongst case studies, OPTAIN will aim for a comprehensive harmonisation and develop common protocols for all major approaches of the project.

Learning Environment ≡

- Get started
- Select case study
- Scenario exploration
- Analyze solutions

OPTAIN case studies


- Schwarzer Schöps
- Petite Glâne
- Csorsza
- Felso-Válicka
- Upper Zgłowiaczka
- Pesnica
- Kobiljski potok/Kebele
- Lesse
- Dotnuvele
- Cherio
- Hobol
- Tetves
- Cechtický
- Dviete



Bio region

- Boreal
- Continental
- Pannonian

Case study overview map



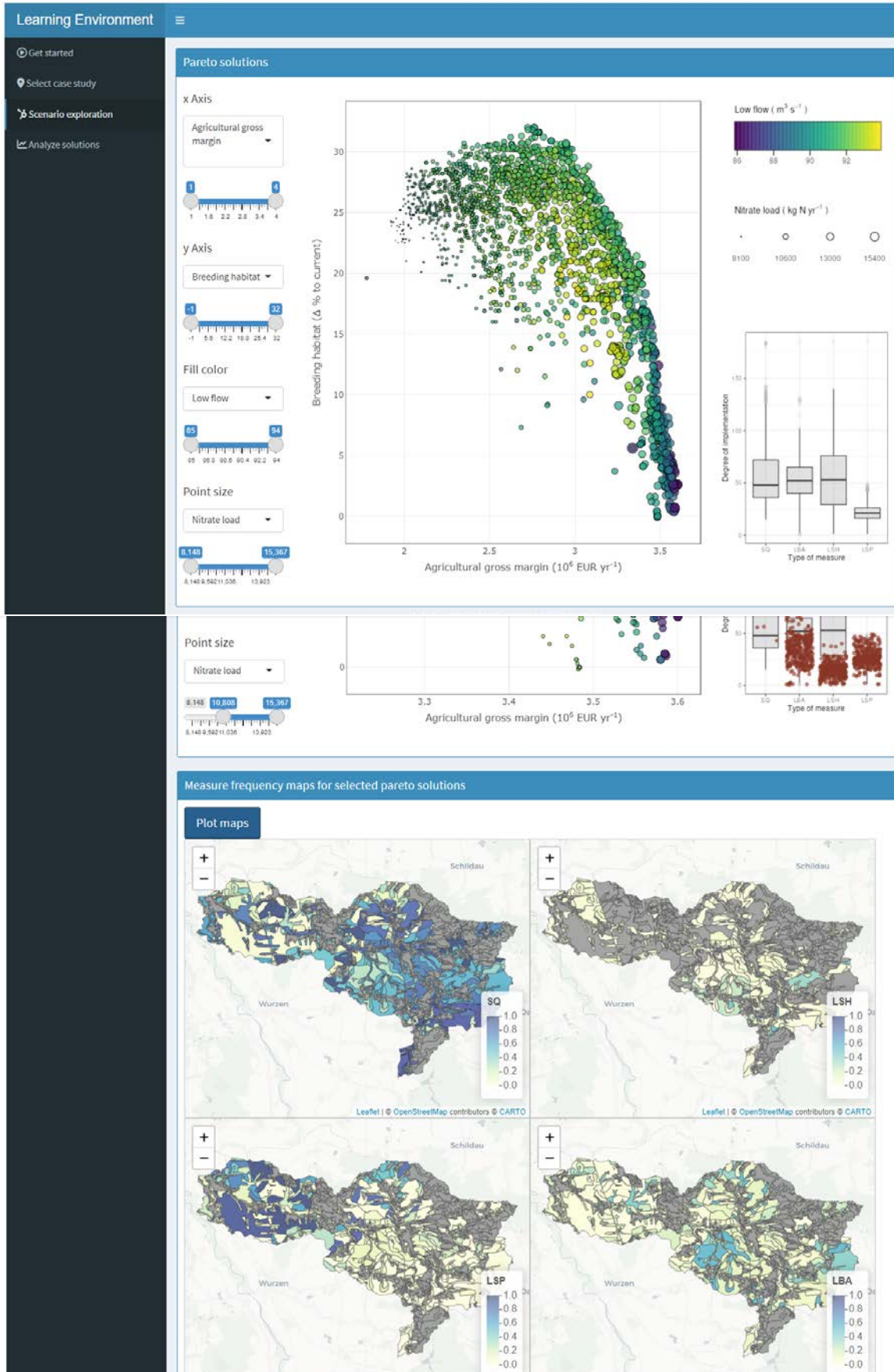


Figure 49: Explorative tool

This tool is still under active development.

Progress Update of Part 2

The interactive Pareto tool 'ParetoPick-R' is now embedded into the Learning Environment, ready to receive input filters to display data of a specific case study or other type of selection coming from the Knowledge Pathways (linked to worked under D5.2).

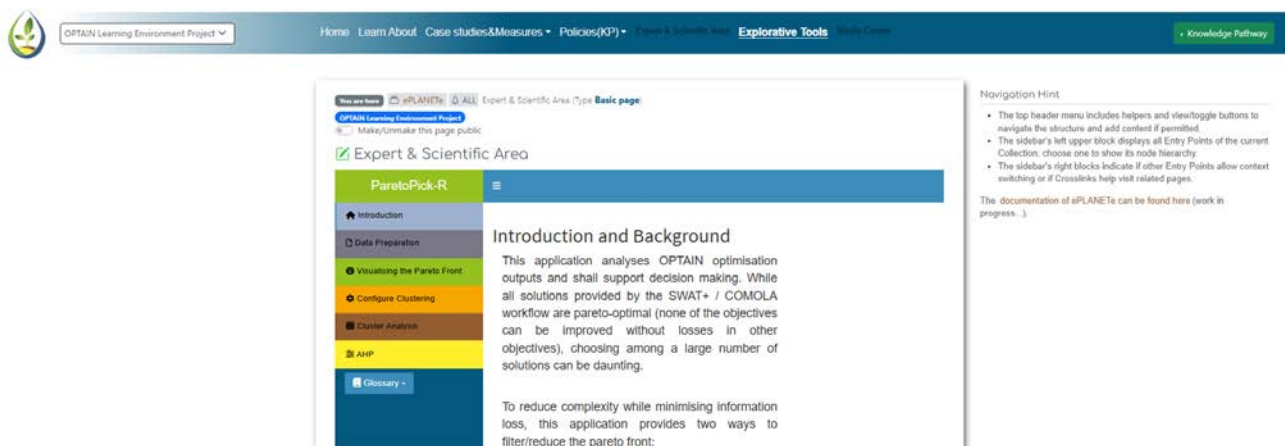


Figure 50: Introduction of the Explorative Tools update

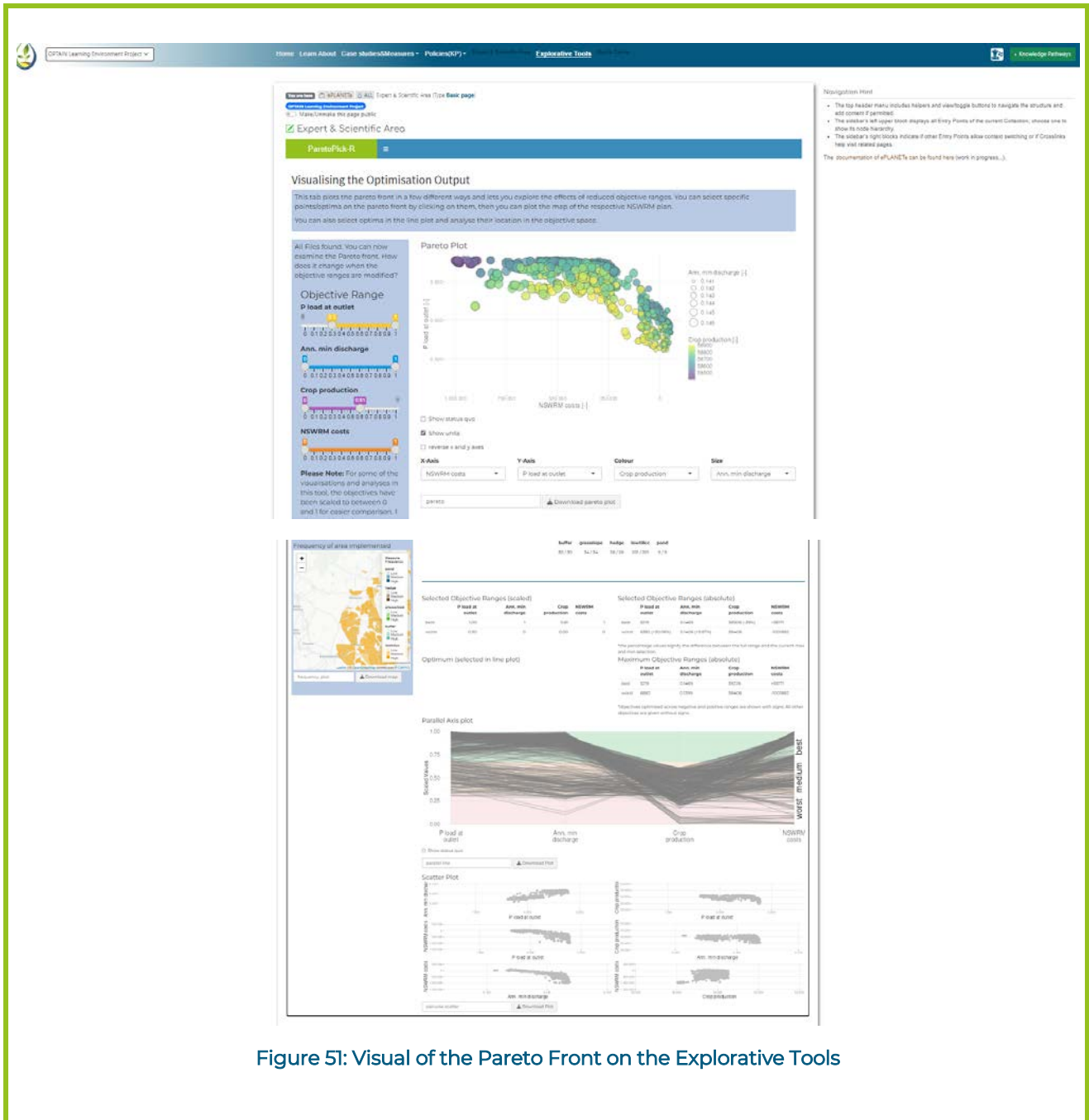


Figure 51: Visual of the Pareto Front on the Explorative Tools

5. Next steps

As the LE has now reached an advanced stage of development, the next steps will focus on:

- Finalising technical developments to ensure full functionality,
- Refining and strengthening the content,
- Expanding stakeholder feedback and testing,
- Ensuring usability across diverse user groups.

Table 3: Next steps in terms of LE section development

<i>Section</i>	Remaining work	ePLANETe Gallery involved (conceptual name)
<i>Learn About</i>	Use filters to link to other parts of the LE (the filters available for the CS, Policies, NSWORMs).	Broceliande
<i>Catalogue</i>	Improve WOCAT NSWORM data representation in the LE. Add filters.	Case Studies & Terrains of Action
<i>NSWRM Policies</i>	Filters	Sustainable Ideas&Actions
<i>Expert & Scientific Area</i>	Complete Representation Rack data matrix, collect and organize PDF files or data results.	DST, Les KIKs, Methods & Tools
<i>Explorative Tools</i>	Links between LE filters (available for CS, Policies, NSWORMs) and the embedded the Knowledge Pathways and the RShiny app	RShiny server
<i>Media Center</i>	Organize folders	Babels ² Gardens
<i>Theme (banner, footer, language selectors, etc.)</i>	The generic theme for all LE in the ePLANETe has been done with the Drupal Bootstrap Barrio Theme. A specific one would be finalized for the OPTAIN LE.	Drupal theme
<i>Content creation workflow</i>	Since the translation system has been built, the last piece of work, which is the workflow (with states like Draft, Review, Needs work, Published), is still under test.	Finish tests

These next steps will ensure that the LE becomes a fully integrated, user-centred knowledge hub. The final stages of testing and refinement will be crucial in delivering a comprehensive and sustainable platform by the end of 2025, ensuring its long-term relevance beyond the life of the project.

Conclusion

The LE has evolved significantly since its conception, with notable advances in navigation, technical functionality and content integration.

As the project progresses, the efforts will focus on finalising content, optimising system functionalities and ensuring a seamless user experience. Testing and collecting feedback will play a central role in refining the final version to align it with stakeholder expectations.

The LE should be fully operational by the end 2025. Its continuous evolution, guided by constant feedback and collaboration, will ensure its relevance beyond the project duration and support long-term knowledge sharing.

Annex 1: WP Leaders interviews

Interview details

- a. Date of the interview:
- b. Name of the interviewee:
- c. Organization of the interviewee:
- d. Job title/function:
- e. Your organization profile:

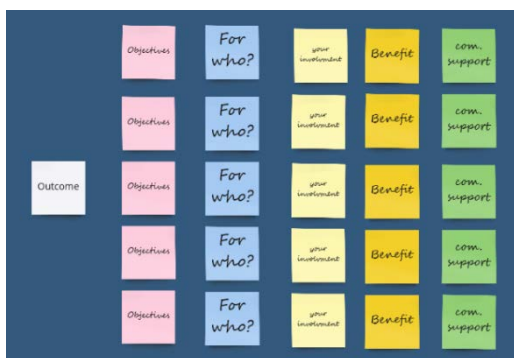
Welcome and introduction

Objectives of the interviews: gather partners' insights on the Learning Environment (audiences, content, development steps, etc.) and OPTAIN outputs.

Partner's presentation and involvement in OPTAIN

- What are your main activities within your organization?
- What are your expectations in terms of NSWRM development?

OPTAIN outputs



- What are, for you as (WP, task, CS leaders), the main OPTAIN outputs (products, services)?
- Which are the ones you are in charge/involved?
- What are their objectives?
- Who are their targets?
- Which benefits will they deliver to OPTAIN potential users?
- Which outputs, activities would require specific support from OPTAIN communication team

Learning Environment

LE objectives

- Main dissemination and co-creation product, allow easy access to OPTAIN results
- Highlight all major improvements in the knowledge on NSWRM from a scientific and actors perspective
- Build capacity

For who?

- Non-experts and experts, decision makers, land-users,
- Cases studies, etc.

Main types of content of the LE

- Catalogue on NSWRM for results of WPs 2/4/6
- Interactive scenario exploration tools for the outputs of WP5
- Special policy related outputs (esp. WP6)
- Pre-selection of tools to assist training effects of the OPTAIN LE (webinars, MOOC, app, e-books, YouTube & Vimeo channels)
- Data, software, document: dedicated to scientists, experts (hydrology, modelling) / transversal to all WG

- From your perspective of WP leader, do you see any additional objectives?
- From your perspective of WP leader, do you see any additional targeted audiences, could you detail some of them?
- Considering the main types of content described in the description of activities, (i) do you see any missing types? (ii) To which objectives should it refer to?
 - What are their development steps, (needs and difficulties) to be anticipated?
 - What benefits will the LE deliver to potential users?

- What would be your involvement in its development?
- Could you give three key words to describe the LE?

Annex 2: Short presentation of the Learning Environment sent to the WP leaders to prepare their interview



Learning environment

LE objectives

- Main dissemination and co-creation product, allow easy access to OPTAIN results
- Highlight all major improvements in the knowledge on NSWM from a scientific and actors perspective
- Build capacity

Main types of content

- Catalogue on NSWRM for results of WPs 2/4/6
- Interactive scenario exploration tools for the outputs of WP5
- Special policy related outputs (esp. WP6)
- Pre-selection of tools to assist training effects of the OPTAIN LE (webinars, MOOC, app, e-books, YouTube & Vimeo channels)
- Data, software, document: dedicated to scientists, experts (hydrology, modelling) / transversal to all WG

For who?

- Non-experts and experts, decision makers, land-users,
- Cases studies, etc.

How to develop the strategy?

- Gather WPs, tasks and CS leaders' insights on the LE and OPTAIN outputs through interviews to get a sense of the needs/expectations/first ideas for the LE
- The materials gathered during the interviews and WP7 propositions will feed the Working Groups (WG) on the design, catalogue and interactive tools to reflect on the development strategy

When

	May	June	July	August
Interviews with WP leaders	█			
Interviews with task leaders		█		
Interviews with CS leaders			█	
WG LE Design			█	
WG Catalogue				█
WG Interactive tools				█
D7.4 LE dev. Strategy V1				█
D7.4 LE dev. Strategy final				█

Learning environment

LE objectives

- Main dissemination and co-creation product, allow easy access to OPTAIN results
- Highlight all major improvements in the knowledge on NSWM from a scientific and actors perspective
- Build capacity

Main types of content

- Catalogue on NSWRM for results of WPs 2/4/6
- Interactive scenario exploration tools for the outputs of WPs
- Special policy related outputs (esp. WP6)
- Pre-selection of tools to assist training effects of the OPTAIN LE (webinars, MOOC, app, e-books, YouTube & Vimeo channels)
- Data, software, document: dedicated to scientists, experts (hydrology, modelling) / transversal to all WG

For who?

- Non-experts and experts, decision makers, land-users,
- Cases studies, etc.

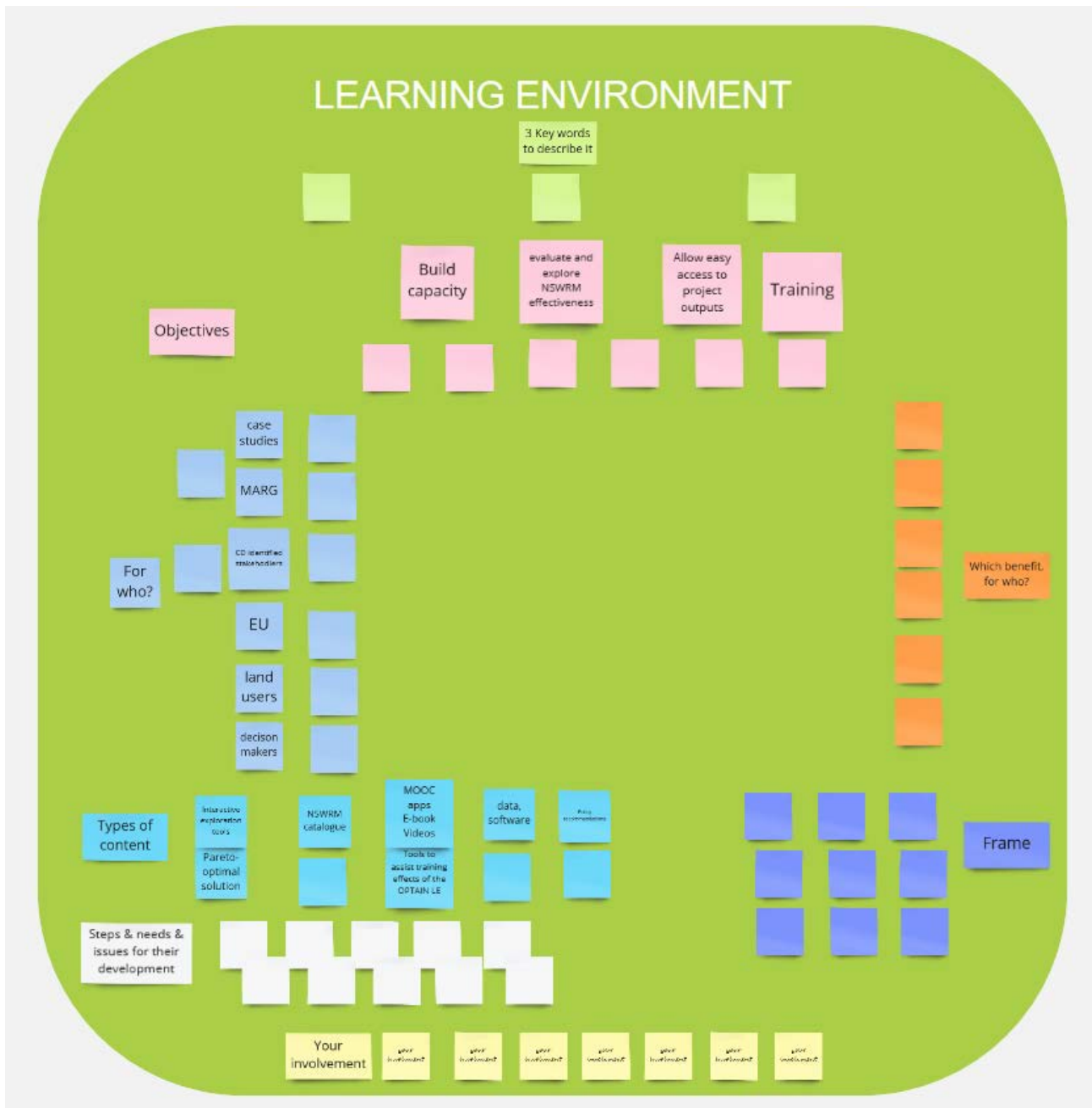
How to develop the strategy?

- Gather WPs, tasks and CS leaders' insights on the LE and OPTAIN outputs through interviews to get a sense of the needs/expectations/first ideas for the LE
- The materials gathered during the interviews and WP7 propositions will feed the Working Groups (WG) on the design, catalogue and interactive tools to reflect on the development strategy

When

	May	June	July	August
Interviews with WP leaders	█			
Interviews with task leaders		█		
Interviews with CS leaders			█	
WG LE Design			█	
WG Catalogue				█
WG Interactive tools				█
D7.4 LE dev. Strategy V1				█
D7.4 LE dev. Strategy final				█

Annex 3: Miro board used to facilitate the interviews with the WP leaders



Annex 4: Learning Environment’s collaborative and co-creative process with partners

This annex refers to the elaboration of the LE vision (and focusses on the project’s partners’ understanding and expectations in terms of objectives, targets, content and design. It presents the key steps of the partners’ involvement.

Over the first year, the engagement with partners took place during different events that are presented in a chronological order in the following sub-sections. The LE focus has progressively grown from LE general presentation to the interactions with WP leaders and partners. Two WP7 workshops were organised open to all the partners. In the meantime, the series of interviews with WP leaders took place and the results provided the content for the second workshop.

First presentations of the Learning Environment

The first presentations made on the LE aimed at explaining the general concept as set in the DoA. It also aimed at starting the reflection process with the partners and bring awareness on the importance to embed their pre-requisites for the LE within their own activities.

At the kick off meeting

The LE main features were presented during the kick off meeting in September 2020 to all the partners (see figure 5). On the third day, a discussion took place (see figure 6) on the collaboration between WP1 and WP7. The involvement of the farmers’ advisors was raised. And a first criteria to be taken into account for the design of the LE was identified with the necessity to have it available in the local languages of the CS. More generally, the importance was highlighted to bring awareness on the LE to the CS stakeholders so their engagement will become easier.

Figure 53- Learning environment presentation at the Kick Off meeting

Task 7.2: OPTAIN Learning Environment and website		OPTAIN						
WHAT?	<ul style="list-style-type: none"> providing the OPTAIN website and Learning Environment, including The necessary methods and IT tools and to move from the show case level developed through the MARG to a general pattern of OPTAIN. <p><i>The development of OPTAIN Learning Environment and related IT tools will play a crucial role to support the communication and dissemination activities and to further engage the MARG and other stakeholders.</i></p>							
WHO?	LEAD: OiEau Participants: GWP, UFZ, UNIBE							
HOW?	<ul style="list-style-type: none"> Bring WP7 into your activities to support the communication and dissemination co-development of OPTAIN learning environment with a strong connection with the MARG Strong need to think ahead 							
WHEN?								
WP7	Communication, dissemination and learning environment	OEau	Y1	Y2	Y3	Y4	Y5	
task 12	Learning environment and website	OEau, CNP, UFZ, UNIBE	D7.1 Launch of OPTAIN website and social media M5	M7.2 First version Learning environment online M24	D7.6 Learning environment development M24	D7.4 Learning environment dev at stage M48	M7.5 Series of 3 regional peer dialogues M50	D7.7 Optain learning env website final version M60

Figure 52- Learning environment discussion at the kick Off meeting


OPTAIN Learning Environment		OPTAIN						
How to steadily but surely set the requirements of the Learning environment ?								
What do we know?	What do we need?	Start the think tank process						
	<ul style="list-style-type: none"> A clear shared understanding on the functionalities and tools/services to set D7.4 How: strong links with both the developers/scientists and the targeted audiences sides (WP1) Proposition: set our Learning Environment task force 	<ul style="list-style-type: none"> What are partners’ understanding and expectations of the learning environment 						
WP7	Communication, dissemination and learning environment	OEau	Y1	Y2	Y3	Y4	Y5	
task 7.2	Learning environment and website	OEau, CNP, UFZ, UNIBE	D7.1 Launch of OPTAIN website and social media M5	M7.2 First version Learning environment online M24	D7.6 Learning environment development M24	D7.4 Learning environment dev at stage M48	M7.5 Series of 3 regional peer dialogues M50	D7.7 Optain learning env website final version M60

At the first MARG workshop

Following the Kick Off meeting, WP7 was invited to the first MARG workshop. The MARG represents the main path towards the collaboration with the potential stakeholders and end-users of the LE.

During the first MARG meeting in December 2020, the general picture of the online LE on NSWRM was introduced to the 30 participants. It was also explained that the LE will allow easy access to project outputs using a variety of interactive online tools and training formats tailored to different targeted audiences from stakeholders to the citizens.

Figure 54- Learning environment presentation at the first MARG meeting

OPTAIN Learning Environment: general picture 

Initial ambition

Develop and provide an online Learning Environment on NSWRM to allow easy access to project outputs using a variety of interactive online tools and training formats tailored to different targeted audiences from stakeholders to the citizens; from an awareness raising approach to the knowledge co-creation and exchange

Analysis of trade-offs and synergies between multiple values/goals in the management and design of NSWRMs by providing

- information (catalogue on NSWRMs)
- Interactive scenario exploration tools
- Pre-selection of tools to assist training effects of the OPTAIN learning env.: webinars, MOOC, app, e-books, YouTube & Vimeo channels

Three steps approach

- Set the strategy, M12
- First on line version, M24
- Final version, M60
- **based on an iterative process (i.e. MARG WS)**

What do we need to start

- A clear & shared understanding of partners' and potential users expectations
- **Strong links with both the developers/scientists and the targeted audiences sides (WP1)**

2

Workshop n°1

The first WP7 virtual workshop took place in March 2021 and was partly dedicated to the Learning environment. One objective was to gather partners' expectations during an interactive break-out group discussion. In the end, the session led to questions on the LE development planning and the partners' mobilisation to contribute to the strategy. The series of interviews was introduced as well as the elaboration of working groups dedicated to knowledge block of the LE.

Figure 55: Learning Environment presentation the 1st WP7 workshop

Learning environment content and way of working

What should the LE contain?

- Catalogue on NSWRM for results of WPs 2/4/6
- Interactive scenario exploration tools for the outputs of WPs
- Special policy related outputs (esp. WP6)
- Pre-selection of tools to assist training effects of the OPTAIN LE (webinars, MOOC, app, e-books, YouTube & Vimeo channels)
- Data, software, document: dedicated to scientists, experts (hydrology, modeling)

But to start with....


Working groups with

- General LE design: WP7/UFZ (+ Cors or Ingrid?)
- Conceptualisation: Benoit, Tatenda + WP7
- Catalogue
 - content: Benoit, Tatenda + WP7 + selected persons from WP4 (e.g. Mikolaj, Federica)
 - WP6 (e.g. Natalja, Matjaz) WP1 to ensure the link with the CS
- Interactive tools: UFZ + WP7

How? first working groups virtual meeting, then one-line discussion groups

Individual partners' perception

Interviews to gather partners' perceptions on the LE objectives, functionalities, targeted users of the as well as to identify their potential support for its development, promotion and related training activities (in link T7.4 with business and exploitation plan)



Interviews with WP leaders

8 interviews were set between the 30 April and the 18 May inviting the WP leaders to answer questions on OPTAIN outputs and LE. Five of them are also CS leaders (see table 3). This means their feedbacks dealt with both the WP leader and CS leader insights;

The objective of the interviews dealing with the LE part was to gather the WP leaders' perception on the objectives, the targeted audiences, the types of content and their related benefit. This part of the interview was based on the synthetic vision of the LE elaborated from the DoA.

The second series of questions dealt with the design of the LE, the steps and needs to develop it. The interviewee were also asked if they have a specific involvement to provide. Finally, the interview ended with the request of providing three key words to describe the LE.

Before their interview, the partners received a word document with the list of questions (see annex 1) and a PDF shortly presenting the LE (see annex 2).

All the questions were organised on an online and interactive board¹⁷ to facilitate the interview and get a simplified picture of the partners' answers.

The interviews lasted between 1 and 2 hours. They all took place on Zoom. They were audio and video recorded. Each of them was transcript.

Workshop n°2

A second WP7 workshop was organised on the 21 June 2021¹⁸. The first part was dedicated to the update on the communication and dissemination effort. The second part was dedicated to the LE in order to

- Present the preliminary results of the first series of interviews for the Learning Environment strategy development with WP leaders
- Discuss the potential end users' profiles for the Learning Environment
- Discuss a first organisation of information for the Learning Environment

The second workshop provided the opportunities to present a summary of the 8 interviews, for the partners to learn about the others' view on the LE, to validate the key new aspects of the LE and envisage the next steps. This is explained in the following section.
















































Figure 56: List of WP leaders' interview

WP	Who	Organisation	Case study	Date
Coordinator	Felix WITING & Martin VOLK	UFZ		06/05/2021
WP1	Cors BRINK	RHDHV		06/05/2021
WP2	Tatenda LEMANN,	UNIBE	Petite Glâne	18/05/2021
WP 3	Brigitta TOTH	ATK	Csorsza / Felso-Valicka + Tetves	11/05/2021
WP 4	Mikolaj PINIEWSKI	WULS	Upper Zgłowiaczka	10/05/2021
WP 5	Michael STRAUCH	UFZ	Schwarzer Schöps	10/05/2021
WP 6	Matjaz GLAVAN	UL	Pesnica, Kebele /Kobiljski potok (SVN part)	12/05/2021
WP 7/involved in WP2	Benoit FRIBOURG-BLANC	OiEau		30/04/2021

¹⁷ The Miro platform was used to facilitate the interviews (<https://miro.com/>)

¹⁸ Bokal, S., Semko, J. & Amorsi, N. (2021): Minutes of training event for project partners on knowledge transfer and dissemination. Deliverable D7.3 EU Horizon 2020 OPTAIN Project, Grant agreement No. 862756

Annex 5: ePLANETe full panomara

Doorways(6)	Thematic Spaces(L2)	Associated Galleries(24)	Type
 TALIESIN & KERRABEL	 Elemental Catalogues	 The Babel' Gardens(Hall of Mirrors)	Complexe
 TALIESIN	 Elemental Catalogues	 Le Toolkit(Theories, Methods, Tools)	complicated
 TALIESIN	 Kerbabel Learning Resource Centre	 Broc&liande Forest	complicated
 TALIESIN	 Teaching Activities & Programmes	 Yggdrasil	complicated
 TALIESIN	KQA	HOT TOPICS	Simple
 TOUTATIS	 ePLANETe Communities	 People  Partners	Simple Simple
 TOUTATIS	 Showroom	 Collaborative Activities  Newsreels	Simple complicated
 FAIRGROUND	Industrial & Territorial Metabolism(MIE)	 Eco-Innovation Terrains	Complexe
 FAIRGROUND	 In the Dagda's Gardens	 Sustainable Ideas&Actions	Simple
 FAIRGROUND & MERLIN	 In the Dagda's Gardens	 Cycles and Cascades	complicated
 MERLIN	 In the Dagda's Gardens	 Virtual Biodiversity Gardens  Territorial Food Baskets	complicated complicated
 MERLIN	 IEA - Integrated Environmental Analysis	 Parc de Patrimoines	complicated
 CAMELOT & TOUTATIS	 Deliberation & Evaluation (INTEGRAAL)	 Worksites/Chantiers(=Uses of the Dagda's Cauldron)	Complexe
 CAMELOT	 In the Dagda's Gardens	 HotSpots	complicated
 KERRABEL	 Deliberation Support Tools	 KerDST  Les K4U  CogiTix(The Universal Cauldron)	Complexe Complexe Complexe
 KERRABEL	 Panoramix(Getting Around ePLANETe)	 The Gallery of Gallery...(Escher)  Les SMMAAD	Complexe Complexe
 KERRABEL	 Elemental Catalogues	 Les KIKs(Indicator Bazaar)  Les Grilles de Representation	Simple Complexe

6. References

Lanceleur P. (2019), *The KerBabel experience: an adventure in the "new" knowledge economy*, Thesis, 2019

Online references

- (a) <https://en.wikipedia.org/wiki/Drupal>
- (b) <https://www.eplanete.blue/portals/eplanete/eplanete-master-plan>, O'Connor, M. (2022). Space Panoramix. ePLANETe website.