PEDvolution

Interoperable solutions to streamline
PED evolution and cross-sectoral integration

Deliverable 4.4

PEDvolution Decision Support Guideline Application

Co-funded by the European Union

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs, Education and Research EAER
State Secretariat for Education, Research and Innovation SERI

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement Nº 101138472.

The Swiss project participants received funding from the Swiss State Secretariat for Education, Research and Innovation (SERI).

Document Summary Information

Grant Agreement No	**101138472**	Acronym	**PEDvolution**
Full Title	**Interoperable solutions to streamline PED evolution and cross-sectoral integration**		
Start Date	**01.01.2024**	Duration	**45 months**
Project URL	**https://www.pedvolution.eu/**		
Deliverable	**D4.4 – PEDvolution Decision Support Guideline Application**		
Work Package	**WP4 – PED Readiness Assessment**		
Contractual due date	**31.12.2025**	Actual submission date	**30.06.2026**
Nature	**Demonstrator, pilot, prototype**	Dissemination Level	**Public**
Lead Beneficiary	**ICOM**		
Responsible Author	**Nikos Charitos (ICOM)**		
Contributions from	**Jesus Daniel Garcia Melo, Inger Andresen (NTNU), Panos Chnarakis (ICOM)**		
Reviewed by	**Evyatar Littwitz (SWW), Reda El Makroum (TUW), Marina Laskari (INLE)**		

Copyright message

©PEDvolution Consortium 2026. This document comprises entirely original and unreleased content unless explicitly stated otherwise. Recognition of previously published material and the contributions of others has been expressed through suitable citation, quotation, or both. Reproduction is permitted, with acknowledgment of the source.

Disclaimer

PEDvolution - This project has received funding from the Horizon Europe Framework Programme (HORIZON) under the GA No. 101138472. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them. The European Commission holds no responsibility for any potential utilisation of the information it contains. The information is presented "as is" with no assurance or warranty, whether explicit or implicit, regarding its suitability for any specific purpose. The user assumes sole responsibility and risk when using this information.

Revision history (including peer reviewing & quality control)

VERSION	ISSUE DATE	COMPLETE[1]	CHANGES	CONTRIBUTOR(S)
v0.1	30/05/25	10%	Initial Deliverable Structure (ToC)	Nikos Charitos (ICOM)
v0.2	27/2/26	20%	Chapters 1 and 2	Nikos Charitos (ICOM)
V0.3	27/3/26	30%	Section 3.4 (draft)	Nikos Charitos (ICOM), Panos Chnarakis (ICOM), Jesus Daniel Garcia Melo (NTNU), Inger Andresen (NTNU)
V0.4	19/6/26	80%	Chapter 3	Nikos Charitos (ICOM)
V0.5	25/6/26	93%	Executive Summary, Chapter 4, Revised Chapters 1-3	Nikos Charitos (ICOM)
V0.6	29/6/26	99%	Review comments.	Evyatar Littwitz (ESG), Marina Laskari (INLE)
V0.7	29/6/26	99%	Quality control check.	Reda El Makroum (TUW)
V0.8	29/6/26	100%	Address review and quality control comments.	Nikos Charitos (ICOM)
v1.0	30/6/26	100%	Final quality control and preparation for submission.	Marina Laskari (INLE), Reda El Makroum (TUW)

1 According to Project's Quality Assurance Process

© PEDvolution, 2025

Table of Contents

Executive Summary 8
1 Introduction 9
1.1 Mapping Project's Outputs 9
1.2 Deliverable Overview and Report Structure 10
2 Overview 12
2.1 End Users 12
2.2 Relation to Requirements 12
2.3 Relation to PEDvolution System Architecture 13
2.4 Design and Development Methodology 15
3 Implementation 17
3.1 Context View 17
3.2 Functional View 18
3.3 Implementation View 19
3.4 User Interface Design 20
4 Conclusions 28
5 References 29

© PEDvolution, 2025

List of Figures

Figure 1: Functional view of the PEDvolution ecosystem [2]. 14
Figure 2: Context view of the DDSG UI module. 17
Figure 3: Functional view of the DDSG UI module. 18
Figure 4: Implementation view of the DDSG UI module. 20
Figure 5: Landing page (pre-login). 21
Figure 6: Landing page (logged in). 22
Figure 7: Current state assessment. 23
Figure 8: Future scenarios. 24
Figure 9: New scenario generation workflow (step 1). 25
Figure 10: New scenario generation workflow (step 2). 26
Figure 11: Scenario results. 27

© PEDvolution, 2025

List of Tables

Table 1: Adherence to Project's GA Deliverable & Tasks Descriptions. 9
Table 2: DDSG User Journey. 15

© PEDvolution, 2025

Glossary of terms and abbreviations used

ABBREVIATION / TERM	DESCRIPTION
CWA	Common Web Application
DDSG	Dynamic Decision Support Guideline
HLUC	High-Level Use Case
PED	Positive Energy District
UI	User Interface
WP	Work Package

© PEDvolution, 2025

EXECUTIVE SUMMARY

This deliverable presents the PEDvolution Dynamic Decision Support Guideline (DDSG) Application, developed in the context of Task 4.5 (Development of the guideline application) of the PEDvolution project. The application provides a web-based user interface (UI) through which PED Planners can interact with the DDSG, supporting the assessment of Positive Energy Districts (PEDs), the generation of future development scenarios, and the analysis of the corresponding decision-support results.

The deliverable first positions the DDSG UI within the broader PEDvolution technical ecosystem by describing its intended end users, its relation to the project requirements, and its integration with the overall system architecture. It also outlines the iterative methodology that was followed during the design and development of the application, including the analysis of project requirements, the creation and refinement of UI mock-ups in collaboration with the DDSG solution provider, and the implementation of the final design.

The implementation of the DDSG UI is documented through complementary architectural views that describe the role of the application within the PEDvolution ecosystem, its functional decomposition, and the technologies employed for its implementation. The application is developed as a module of the PEDvolution Common Web Application (CWA) for PED Planning Tools, providing a unified user experience while communicating with the DDSG through well-defined interfaces. The complete CWA will be made available to authorised users through the project's deployment infrastructure, considering security and privacy aspects.

Finally, the deliverable presents the complete UI design of the DDSG application through a series of representative screens that illustrate the main user workflows, from accessing the application and reviewing the current state of a PED to configuring future scenarios and analysing the generated results. These designs establish the basis for the implementation and demonstration of the DDSG application during the subsequent phase of the PEDvolution project. The demonstration of the DDSG application in the PEDvolution pilots will occur in the context of WP9 – PEDvolution demonstrators and performance assessment.

© PEDvolution, 2025

1 INTRODUCTION

This deliverable presents the design and implementation of the PEDvolution DDSG Application, developed in the context of Task T4.5 (Development of the Guideline Application). The objective of the deliverable is to document the prototype web application that enables PED Planners to interact with the DDSG through an intuitive graphical UI, supporting the assessment of PEDs, the generation of future scenarios, and the analysis of the corresponding decision-support results.

In doing so, the deliverable contributes to the overall objectives of PEDvolution by providing a user-oriented interface that facilitates the practical exploitation of the DDSG within the common ecosystem of PED Planning Tools.

To achieve this objective, the work followed an iterative development approach, starting from the analysis of the project requirements and system architecture, continuing with the design and refinement of UI mock-ups in close collaboration with the DDSG solution provider, and resulting in the implementation and documentation of the application through complementary architectural views and the presentation of the final UI.

1.1 Mapping Project's Outputs

Purpose of this section is to map PEDvolution's Grant Agreement commitments, both within the formal Deliverable and Task description, against the project's respective outputs and work performed.

Table 1: Adherence to Project's GA Deliverable & Tasks Descriptions.

PROJECT GA COMPONENT TITLE	PROJECT GA COMPONENT OUTLINE	RESPECTIVE DOCUMENT CHAPTER(S)	JUSTIFICATION
DELIVERABLE			
D4.4 – PEDvolution Decision Support Guideline Application	PEDvolution decision support guideline application. Development of prototype web application, putting emphasis on easy-to-use workflows, offering a framework that can be adapted to changes in technologies, markets, and user needs, in line with the PEDvolution concept (T4.5).	Chapters 2-3	Chapter 2 provides the reader with an overview of the work carried out in T4.5 by presenting the end users of the DDSG UI and the relation of this UI to the PEDvolution requirements and system architecture. Furthermore, the employed methodology for the design and development of the DDSG UI is described. Chapter 3 documents various implementation aspects of the DDSG UI by exposing its context, functional and implementation views, as well as its design.
TASKS			

© PEDvolution, 2025

T4.5 – Development of the guideline application	Development of the application, that will implement the logic of the guideline (T4.4) and provide an intuitive graphical user interface for PED solution providers. Initially the architecture and technical specification of the application will be documented, including the layout of the application, its content and functionality, as well as its underlying structure and nomenclature (D4.4). On this basis, a prototype web application will be developed, putting emphasis on easy-to-use workflows, offering a framework that can be adapted to changes in technologies, markets, and user needs, in line with the PEDvolution concept.	Chapters 2-3	The purpose of the DDSG UI, as positioned in the scope of the project and the context of WP4 is presented in Chapter 2. The actual implementation is fully documented in Chapter 3 by utilising various views of the system architecture and by exposing the UI design. Although the primary end users of the DDSG UI are PED Planners, the application also supports the DDSG solution provider by enabling intuitive interaction between end users and the DDSG. In this sense, the developed UI fulfils the intended objective of providing an intuitive graphical interface for exploiting the DDSG within the PEDvolution ecosystem.

1.2 Deliverable Overview and Report Structure

This deliverable documents the design and implementation of the PEDvolution DDSG application, developed in the context of T4.5 (Development of the Guideline Application). It presents the DDSG UI, its role within the PEDvolution CWA for PED Planning Tools, the architectural views describing the DDSG UI, and the final UI design supporting the interaction of PED Planners with the DDSG.

The remainder of the deliverable is organised as follows:

- Chapter 2 – Overview, introduces the DDSG application by presenting its intended end users, its relation to the PEDvolution requirements and system architecture, and the methodology followed during the design and development of the application.
- Chapter 3 – Implementation, presents the implementation of the DDSG UI through complementary architectural views, including the context, functional, and implementation views, followed by the description of the final user interface design and the main user workflows supported by the application.
- Chapter 4 – Conclusions, summarises the work presented in the deliverable and outlines its contribution to the subsequent demonstration and validation activities of the PEDvolution project.

© PEDvolution, 2025

The work presented in this deliverable builds upon the outputs of several previous PEDvolution activities. In particular, D1.2 – Functional and Operational Requirements of the Demo Sites and Reference Use Cases [1] provides the functional requirements and High-Level Use Cases (HLUCs) that guided the design of the DDSG UI, while D1.3 – System architecture and technical specifications [2] documents the system architecture of the PEDvolution ecosystem. Furthermore, D4.3 – Specifications and Plan for Testing and Deployment of PEDvolution Decision Support Guideline [3] specifies the functionalities, user workflows, and operational characteristics of the DDSG, which constitute the basis for the implementation of the DDSG UI presented in this deliverable. Moreover, D3.1 – Cohesive Toolchain for Integrated Modelling of PED via Digital Twin [4], which reports the specifications of the PED Design and Planning Toolset, was accounted for the definition of the common technical architecture within which the DDSG UI is integrated as part of the PEDvolution CWA for PED Planning Tools. Together, these deliverables establish the functional, architectural, and technical foundations upon which the DDSG application has been designed and implemented.

© PEDvolution, 2025

2 OVERVIEW

This chapter provides an overview of the Dynamic Decision Support Guideline (DDSG) application within the context of the PEDvolution project. It presents the intended end users of the application, its relation to the project requirements and system architecture, and the methodology followed during its design and development. Together, these elements provide the necessary context for understanding the implementation choices and user workflows described in the subsequent chapter.

2.1 End Users

The primary end users of the PEDvolution DDSG application are PED Planners. These users are responsible for assessing the current state of Positive Energy Districts (PEDs), exploring alternative development pathways, and evaluating future scenarios that can support the transition of districts towards PED objectives.

The DDSG application is designed to assist PED Planners through an intuitive web-based user interface that enables them to review PED assessments, generate and analyse future scenarios based on selected priorities and time horizons, and access graphical reports and recommendations. The application aims to support informed decision-making throughout the PED planning process, while remaining accessible to users who may not possess extensive technical expertise in the underlying assessment methodologies.

2.2 Relation to Requirements

The main interactions of the PEDvolution technical ecosystem with external systems and end users were analysed during the requirements engineering activities of Sub-Task 1.2.1 and documented in the form of High-Level Use Cases (HLUCs). In particular, HLUC-2 – Identification of Energy Improvement Opportunities towards PED Characterisation, which describes the interactions between the DDSG, other components of the PEDvolution ecosystem, and the end users of the solution, namely PED Planners. This HLUC was documented in D1.2 – Functional and Operational Requirements of the Demo Sites and Reference Use Cases [1].

Building upon this initial requirements analysis, the functional specifications and expected behaviour of the DDSG were further elaborated within WP4 and documented in D4.3 – Specifications and Plan for Testing and Deployment of PEDvolution Decision Support Guideline [3]. The documented requirements include support for the assessment of the current state of a PED, the generation and management of future scenarios based on user-selected priorities and time horizons, the presentation of results and recommendations through intuitive visualisations and reports, and user-friendly workflows enabling PED Planners to efficiently interact with the DDSG. The DDSG UI, which is the focus of this deliverable, has been designed to support PED Planners in interacting with the DDSG through intuitive and easy-to-use workflows, enabling them to assess the current state of a PED, generate future scenarios, and analyse the corresponding results and recommendations produced by the DDSG.

© PEDvolution, 2025

2.3 Relation to PEDvolution System Architecture

The PEDvolution technical ecosystem aims to support the design, assessment, planning and management of Positive Energy Districts (PEDs) through a set of interoperable digital solutions. Within this ecosystem, the DDSG assists PED Planners in assessing the current state of a PED and exploring future development scenarios, while interacting with other PEDvolution components through the common architecture and data exchange mechanisms defined by the project.

A functional viewpoint for the PEDvolution ecosystem is presented in Figure 1, where the focus of T4.5 (Development of the guideline application) activities and correspondingly of the DDSG UI component is highlighted.

© PEDvolution, 2025

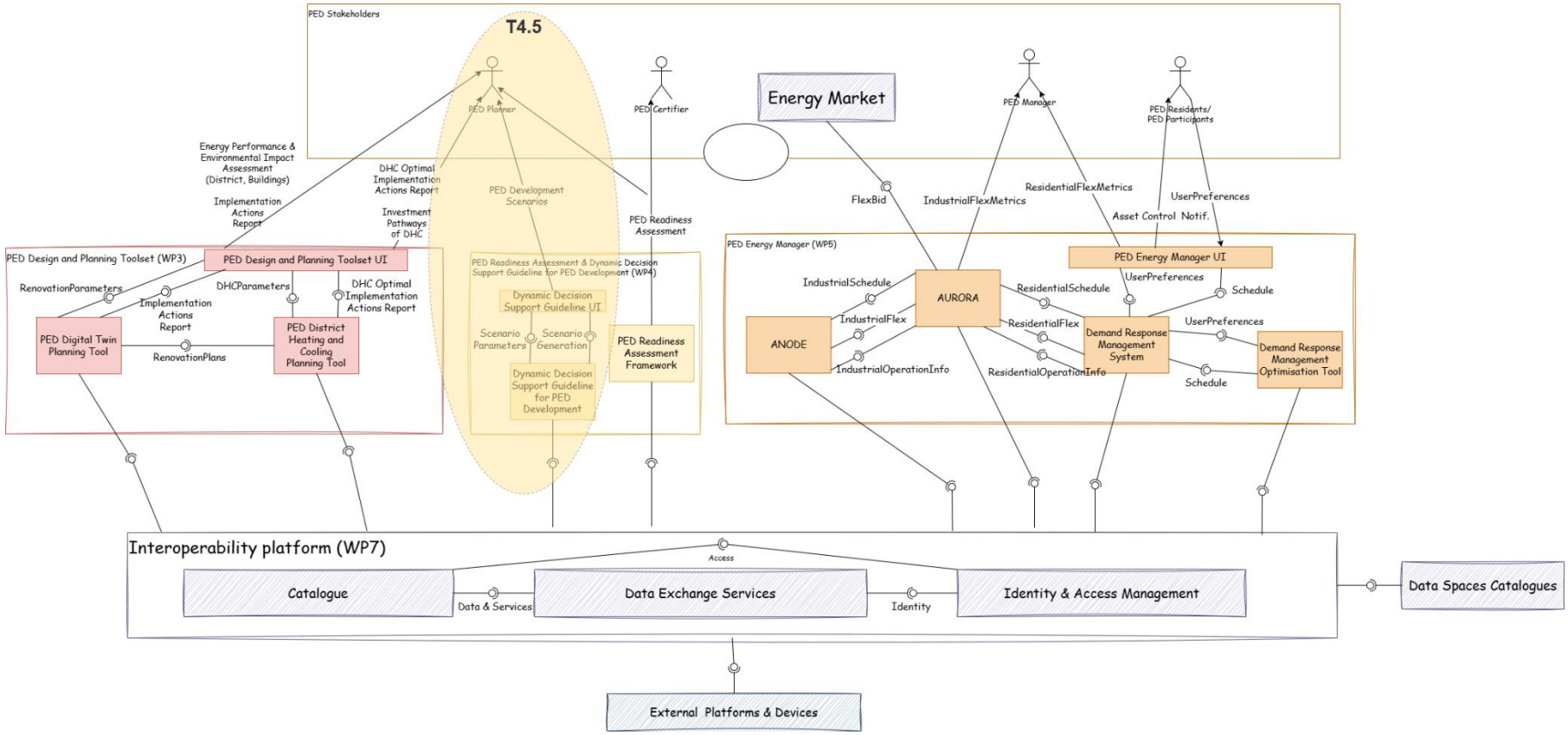


Figure 1: Functional view of the PEDvolution ecosystem [2].

2.4 Design and Development Methodology

The development of the DDSG UI followed an iterative design and implementation process involving close collaboration between ICOM, which is responsible for the DDSG UI development, and NTNU, which is the provider of the DDSG solution. The process was initiated through the analysis of the PEDvolution requirements and use cases, as documented in the PEDvolution requirements engineering activities and further elaborated in the specifications of the DDSG, as explained in Section 2.2 of this document.

Based on these requirements, an initial set of DDSG UI mock-ups was created to define the main user workflows and visualise the interaction of PED Planners with the DDSG functionalities. The proposed designs were reviewed together with the DDSG solution provider in order to refine the user experience, align the UI with the capabilities of the underlying DDSG, and ensure that the supported workflows addressed the needs of PED Planners, as communicated by the PED Planners to the DDSG solution provider. The final set of mock-ups served as the baseline for the implementation activities.

Following the completion of the design phase, the DDSG UI has been implemented as part of the CWA for PED Planning Tools developed in PEDvolution. The implementation process has followed the agreed UI design while taking into account technical discussions between the DDSG solution provider and the DDSG UI provider during development. Particular emphasis has been placed on providing intuitive workflows for assessing the current status of a PED, generating future scenarios, and analysing the corresponding results and recommendations.

The overall user journey supported by the DDSG UI is summarised in Table 2. This user journey was derived from the final UI design and has been utilised as a reference throughout the development process to ensure consistency between the envisioned workflows and the implemented solution. The demonstration and validation activities with end users are planned to take place during the pilot phase of the project, where additional feedback can be collected and considered for potential future improvements of the application, so that it addresses appropriately the user needs.

Table 2: DDSG User Journey.

Step	Screen/Feature	User Action	System Response
1	Common PED Planning Tools – Landing Page (Pre-Login)	User accesses the PED Planning Tools web application.	The landing page of the CWA is displayed.
2	Common PED Planning Tools – Landing Page (Logged In)	User authenticates and logs into the platform.	The available PED Planning Tools are presented, and the user selects the DDSG module.
3	DDSG – Current State Assessment	User opens the DDSG module.	The current assessment of the PED is displayed, including the current scores for the different priority

© PEDvolution, 2025

			categories and the generated assessment.
4	DDSG – Future Scenarios	User navigates to the Future Scenarios section.	The system displays previously generated future scenario reports and provides the option to generate a new scenario.
5	DDSG – Scenario Configuration and Generation	User selects Generate Scenario, defines the priority category, timespan and relevant strategies, and confirms the configuration.	The DDSG evaluates the selected configuration and generates a future PED scenario together with the corresponding assessment results. The scenario is subsequently stored and becomes available in the Future Scenarios list.
6	DDSG – Scenario Results	User views the generated scenario results and explores the available indicators and visualisations.	The system presents the future scenario assessment, including updated scores, assessment results and graphical representations of the generated outcomes. The user may also download the generated report.

© PEDvolution, 2025

3 IMPLEMENTATION

This chapter presents the implementation of the DDSG UI developed within the PEDvolution project. It describes the DDSG UI from different architectural perspectives, including its context within the PEDvolution ecosystem, its functional and implementation views, and its user interface design. Together, these views provide a comprehensive overview of the DDSG UI, illustrating its main components, the technologies employed for its implementation, and the user workflows that enable PED Planners to interact with the DDSG through the PEDvolution CWA for PED Planning Tools.

3.1 Context View

This section presents a high-level view of the DDSG UI, focusing on its interactions with external actors and systems. The DDSG UI is implemented as a module of the PEDvolution CWA for PED Planning Tools and provides PED Planners with an intuitive web-based environment for interacting with the DDSG solution.

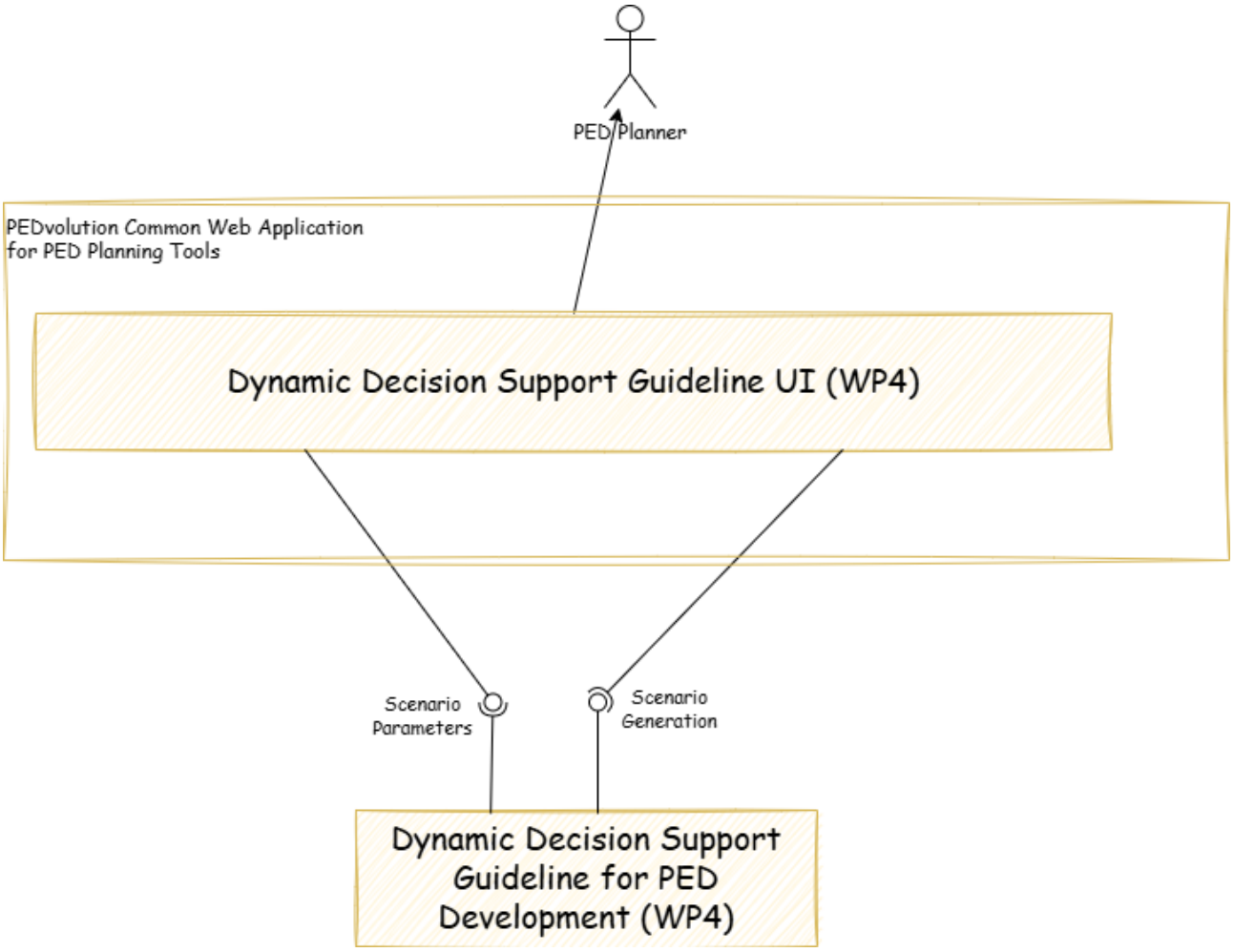


Figure 2: Context view of the DDSG UI module.

The DDSG UI supports the main user workflows required for assessing the current state of a PED, generating future development scenarios, and reviewing the corresponding results and recommendations. Through the DDSG UI, PED Planners can explore alternative development pathways by selecting planning priorities and time horizons, initiating scenario generation processes, and analysing the outputs produced by the DDSG.

Figure 2 presents the context view of the DDSG UI. The primary external actor is the PED Planner, who interacts with the application through the graphical user interface. The DDSG UI communicates with the DDSG solution by exchanging the information required for scenario generation and analysis. More specifically, the DDSG UI provides the DDSG with the scenario parameters selected by the user and receives the corresponding results generated by the DDSG. These interactions enable PED Planners to assess the current state of a PED and evaluate alternative future scenarios through a unified and easy-to-use web application environment.

3.2 Functional View

This section presents the functional view of the DDSG UI. The DDSG UI is implemented as a module of the PEDvolution CWA for PED Planning Tools and provides the user-facing functionalities through which PED Planners interact with the DDSG.

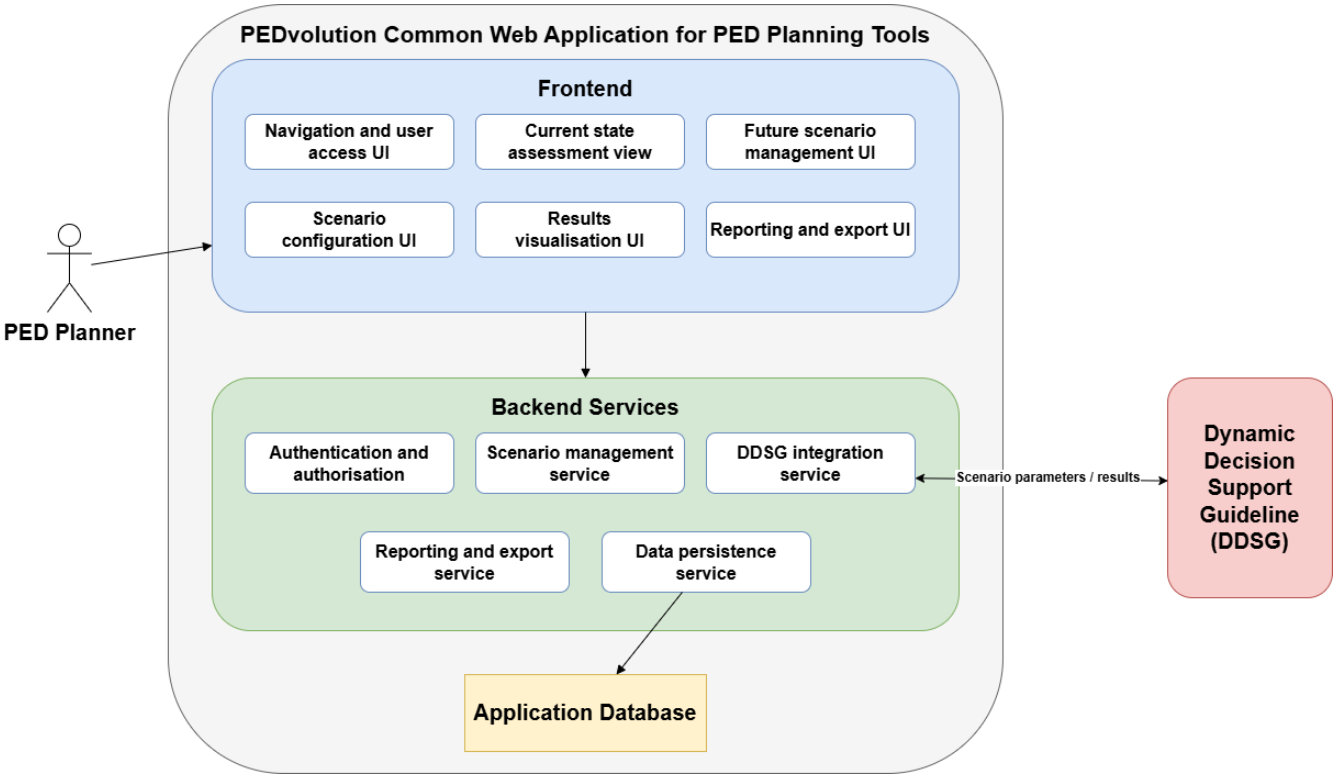


Figure 3: Functional view of the DDSG UI module.

Figure 3 presents the main functional components of the DDSG UI and the related backend services. The frontend part of the DDSG UI includes components for navigation and user access, current-state assessment, future scenario management, scenario configuration, results visualisation, and reporting/export. These components support the main workflows required by PED Planners, including

the inspection of the current state of a PED, the configuration of future scenarios, and the interpretation of DDSG-generated results.

The backend services support the operation of the DDSG UI by handling access control, managing scenario-related operations, coordinating communication with the DDSG, supporting reporting/export functionalities, and managing persistence of application data. The DDSG integration service is responsible for exchanging scenario parameters and results with the DDSG developed by NTNU. The data persistence service stores application data required by the CWA, including PED-related access information, scenario metadata, and saved scenario outputs.

Overall, the functional view separates the user-facing DDSG UI components from the supporting backend services and the external DDSG solution. This separation allows the DDSG UI to provide an intuitive interface for PED Planners while keeping the underlying DDSG logic encapsulated in the solution developed and maintained by NTNU.

3.3 Implementation View

This section presents the implementation view of the DDSG UI. The DDSG UI is implemented as a single project-wide web application module within the PEDvolution CWA for PED Planning Tools. The implementation follows a web-based architecture composed of a frontend layer, backend services, a relational persistence layer, and an integration interface with the DDSG developed by NTNU.

Figure 4 presents the implementation view of the DDSG UI. The PED Planner accesses the application through a web browser. The frontend is implemented as a React [5] and TypeScript [6] web application, built with Vite [7] and styled using Tailwind CSS [8]. This layer renders the DDSG screens, manages the user interaction workflows, collects scenario configuration parameters, presents current-state assessments, displays scenario results, and supports reporting or export actions.

The backend is implemented as a Python FastAPI [9] service that exposes REST-based interfaces to the frontend. It handles the application logic required by the DDSG UI, including scenario management, request validation, user-context handling, authorisation checks, reporting/export support, and communication with the DDSG. The backend acts as the integration layer between the user-facing DDSG UI and the DDSG solution itself, which is maintained by NTNU.

Application data are persisted in a PostgreSQL relational database [10]. This database stores structured information required by the DDSG UI and the wider CWA, such as PED entities, authorised user-to-PED associations, scenario metadata, selected parameters, saved scenario results, and report-related information. SQLAlchemy [11] is used as the database access and object-relational mapping layer between the backend services and the database.

Authentication and authorisation are handled as common platform concerns of the PEDvolution CWA. PED Planners access the application through persistent user accounts, enabling them to authenticate securely and retain access to the PED assigned to them across multiple sessions. The implementation is intended to rely on JWT bearer tokens and to remain compatible with OAuth2/OpenID Connect-based identity management approaches. Backend services enforce the required access control logic, including per-PED authorisation, so that each PED Planner can only access the PED for which they are authorised.

© PEDvolution, 2025

The DDSG itself remains a separately hosted solution owned and maintained by NTNU. Communication between the CWA backend and the DDSG is performed through REST-based interfaces. The backend sends the scenario parameters selected by the user, such as PED identifier, priority, and time horizon, and receives the corresponding scenario results, recommendations, and report-related outputs.

The frontend and backend components are intended to be containerised and deployed using Docker-based packaging [12], with GitLab CI/CD pipelines [13] supporting build, test, and deployment automation where applicable. This implementation approach supports maintainability, repeatability, and alignment with the wider deployment practices of the PEDvolution CWA.

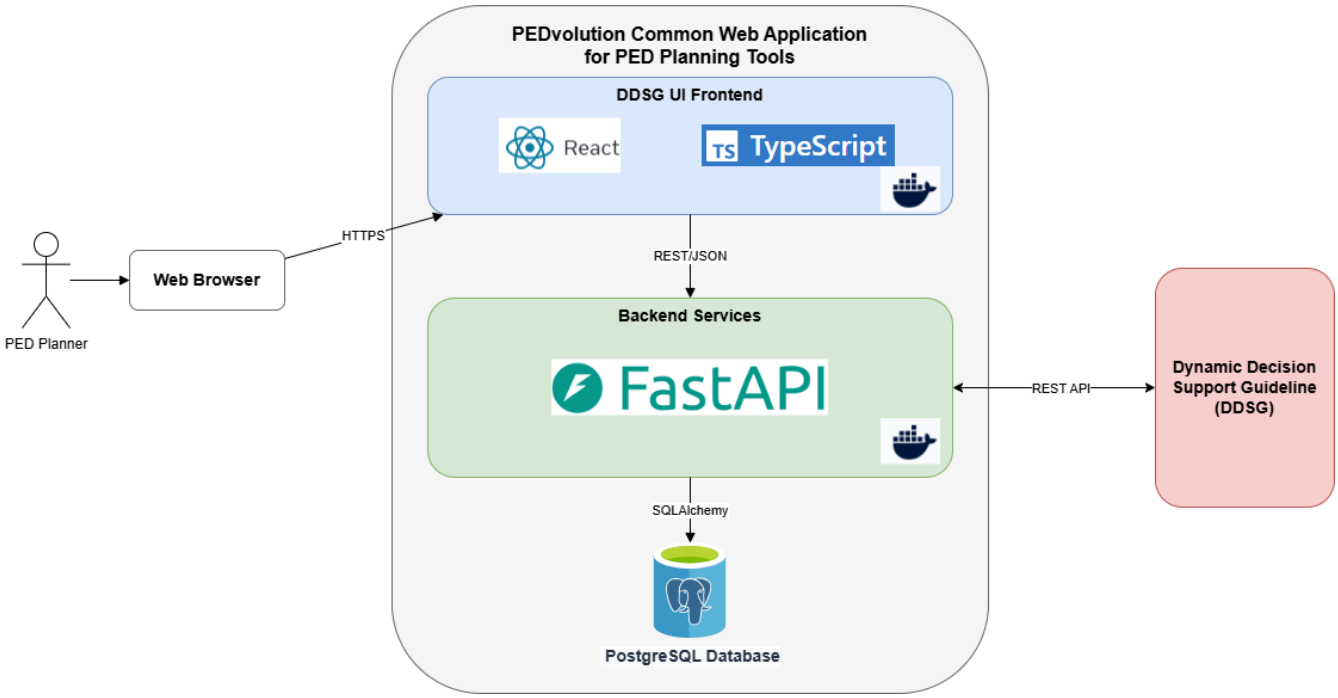


Figure 4: Implementation view of the DDSG UI module.

3.4 User Interface Design

This section presents the UI design of the DDSG application. The objective is to illustrate the main user workflows supported by the application and the corresponding interaction of PED Planners with the DDSG. It should be noted that all figures presented in this section contain mocked data for demonstration purposes only and do not represent operational data from any PEDvolution demonstrator.

Landing Page (Pre-Login)

Figure 5 presents the landing page of the PEDvolution CWA for PED Planning Tools before user authentication. This screen provides an entry point to the application and presents general information about the available planning tools. Users can initiate the authentication process to gain access to the functionalities of the platform according to their assigned permissions.



Figure 5: Landing page (pre-login).

Landing Page (Logged In)

Following successful authentication, the landing page shown in Figure 6 presents the planning tools available to the authenticated user. From this screen, the PED Planner can navigate to the DDSG module and access the functionalities available for the PED to which the user has been granted access.



Figure 6: Landing page (logged in).

Current State Assessment

The Current State Assessment screen, illustrated in Figure 7, provides an overview of the current assessment of the relevant PED. The screen presents the current performance of the PED across the different assessment dimensions together with the corresponding visualisations and assessment results generated by the DDSG. This information establishes the baseline against which future planning scenarios can subsequently be evaluated.

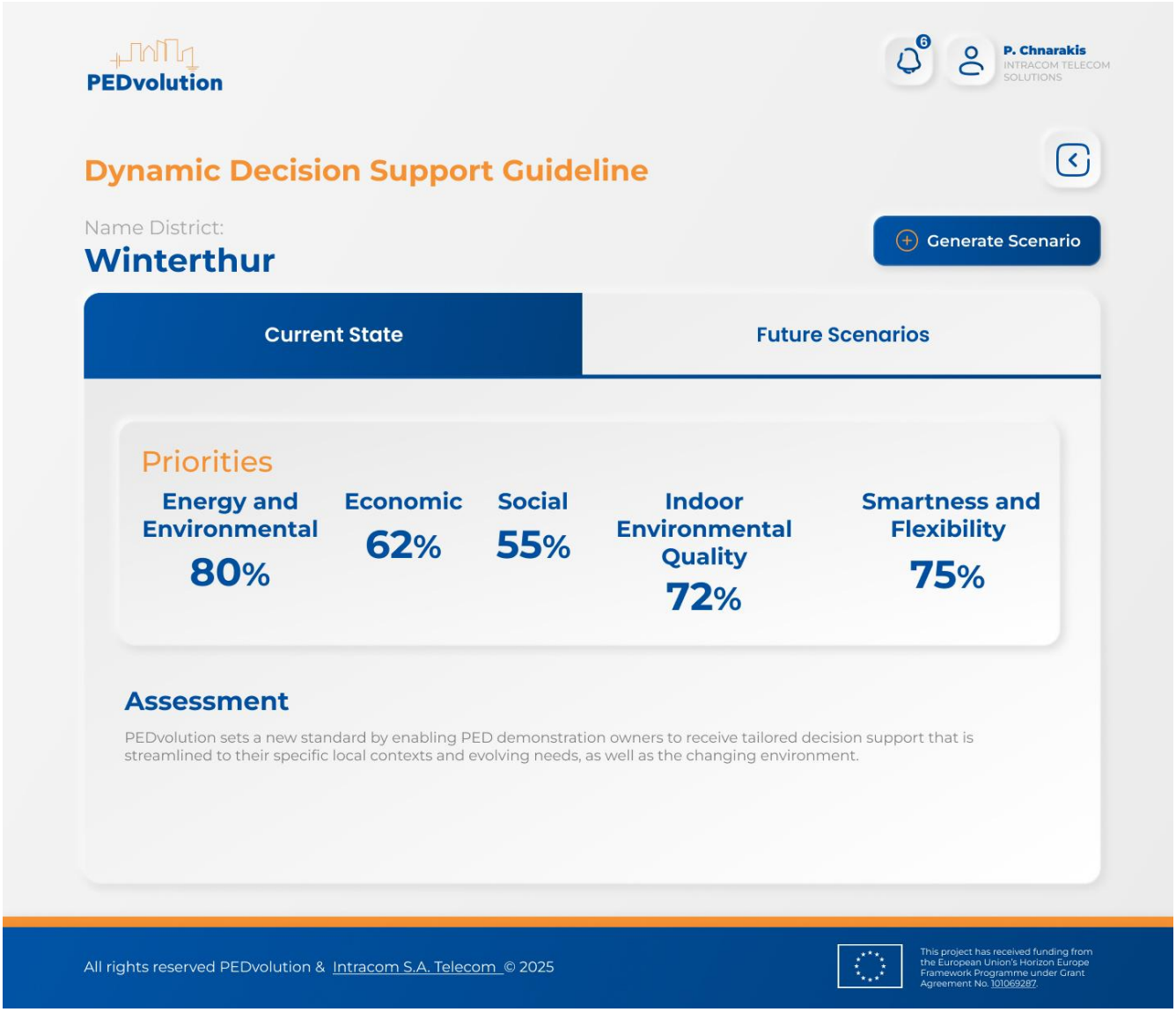


Figure 7: Current state assessment.

Future Scenarios

Figure 8 presents the Future Scenarios screen, which serves as the central workspace for managing previously generated scenarios. From this screen, PED Planners can browse the available scenario reports, review previously generated results, and initiate the generation of a new future scenario through the corresponding workflow.

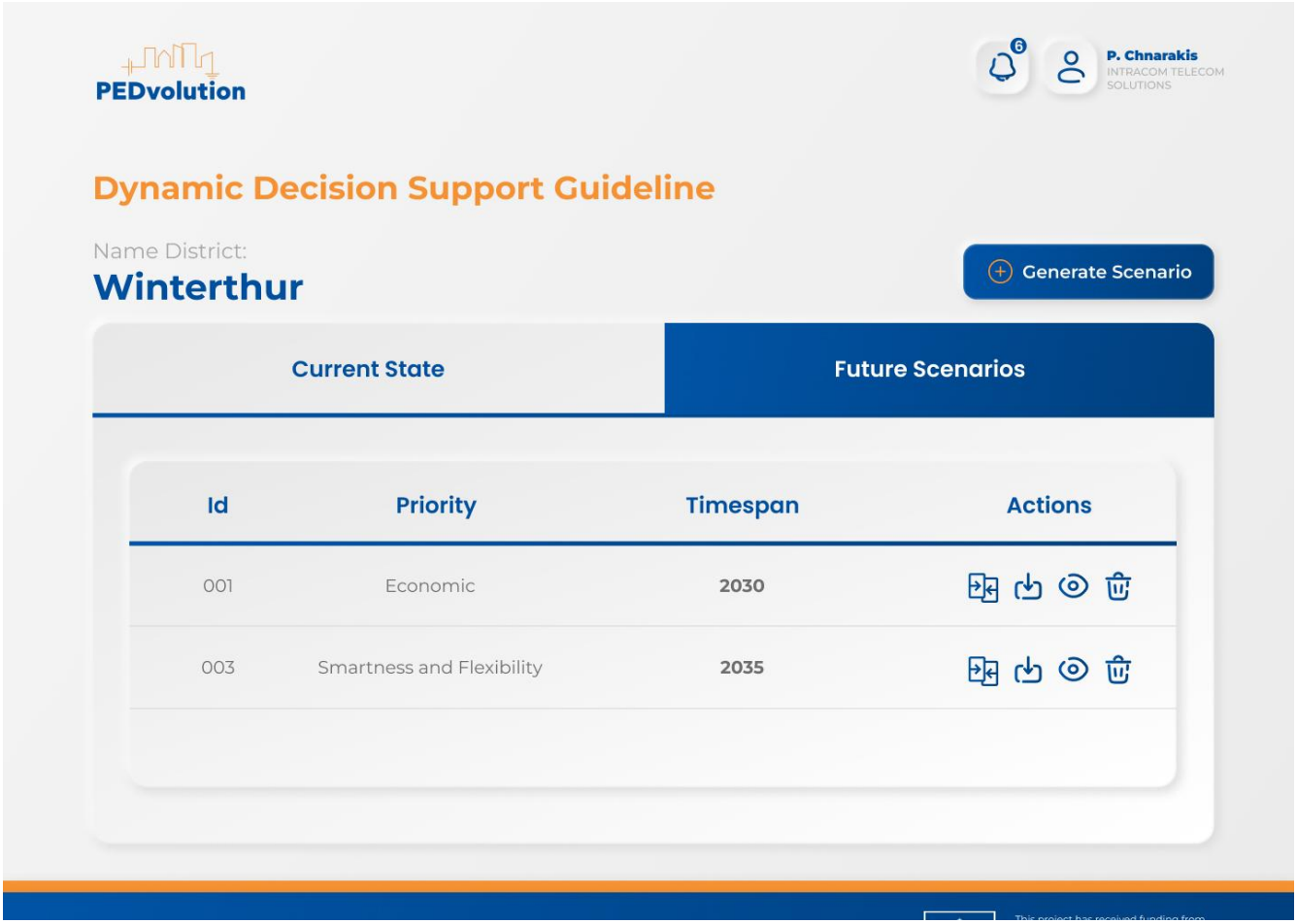


Figure 8: Future scenarios.

Scenario Configuration and Generation

The scenario generation workflow is illustrated through Figures 9, 10 and 11. Figure 9 presents the first step of the scenario generation dialogue, where the PED Planner selects the planning priority and the desired time horizon. Figure 10 illustrates the subsequent step, during which the user is presented with more details on the available strategies to be considered for this scenario. After the selected configuration has been confirmed, the DDSG processes the submitted parameters and generates the corresponding future scenario together with its assessment results, as illustrated in Figure 11.

© PEDvolution, 2025

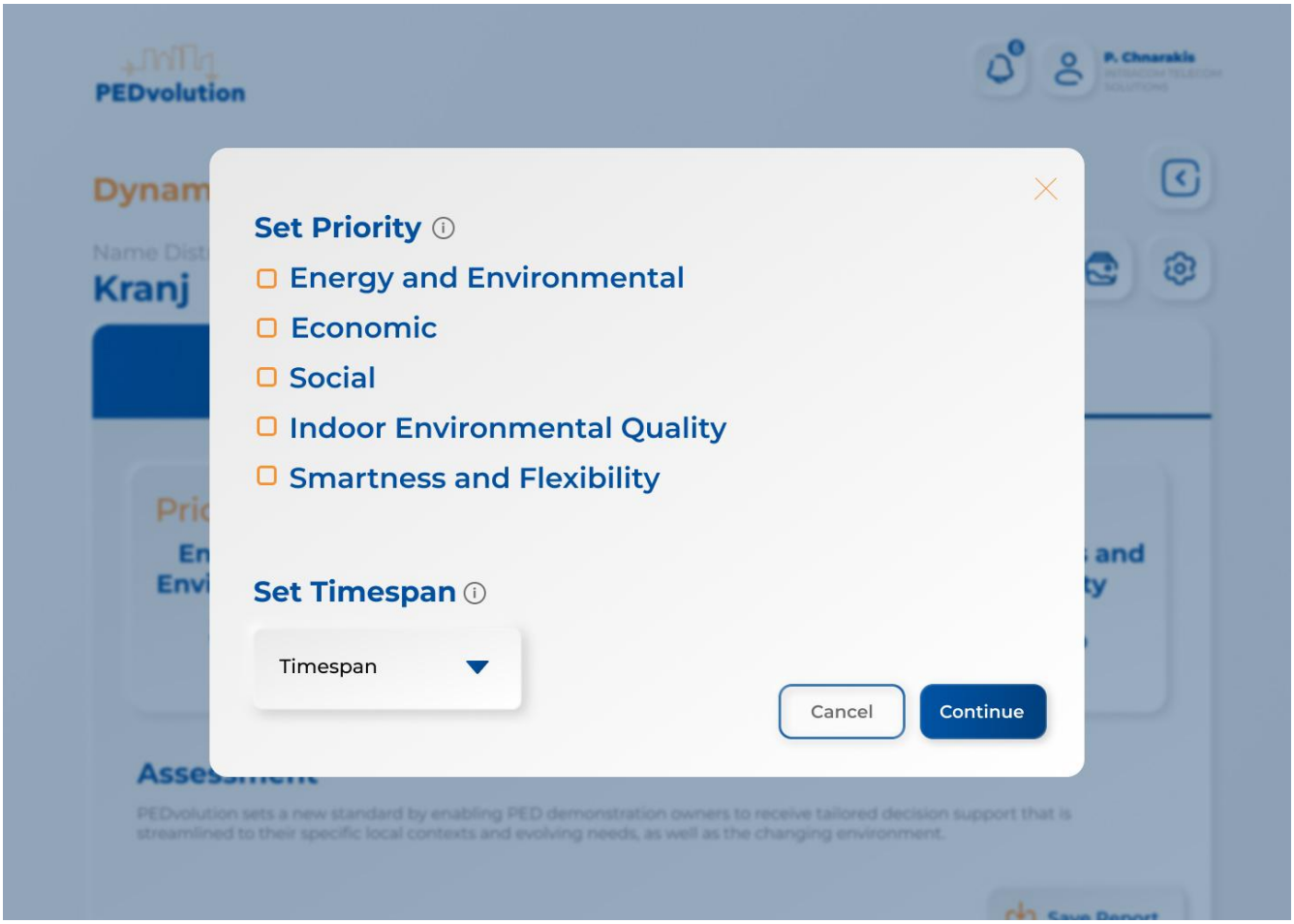


Figure 9: New scenario generation workflow (step 1).

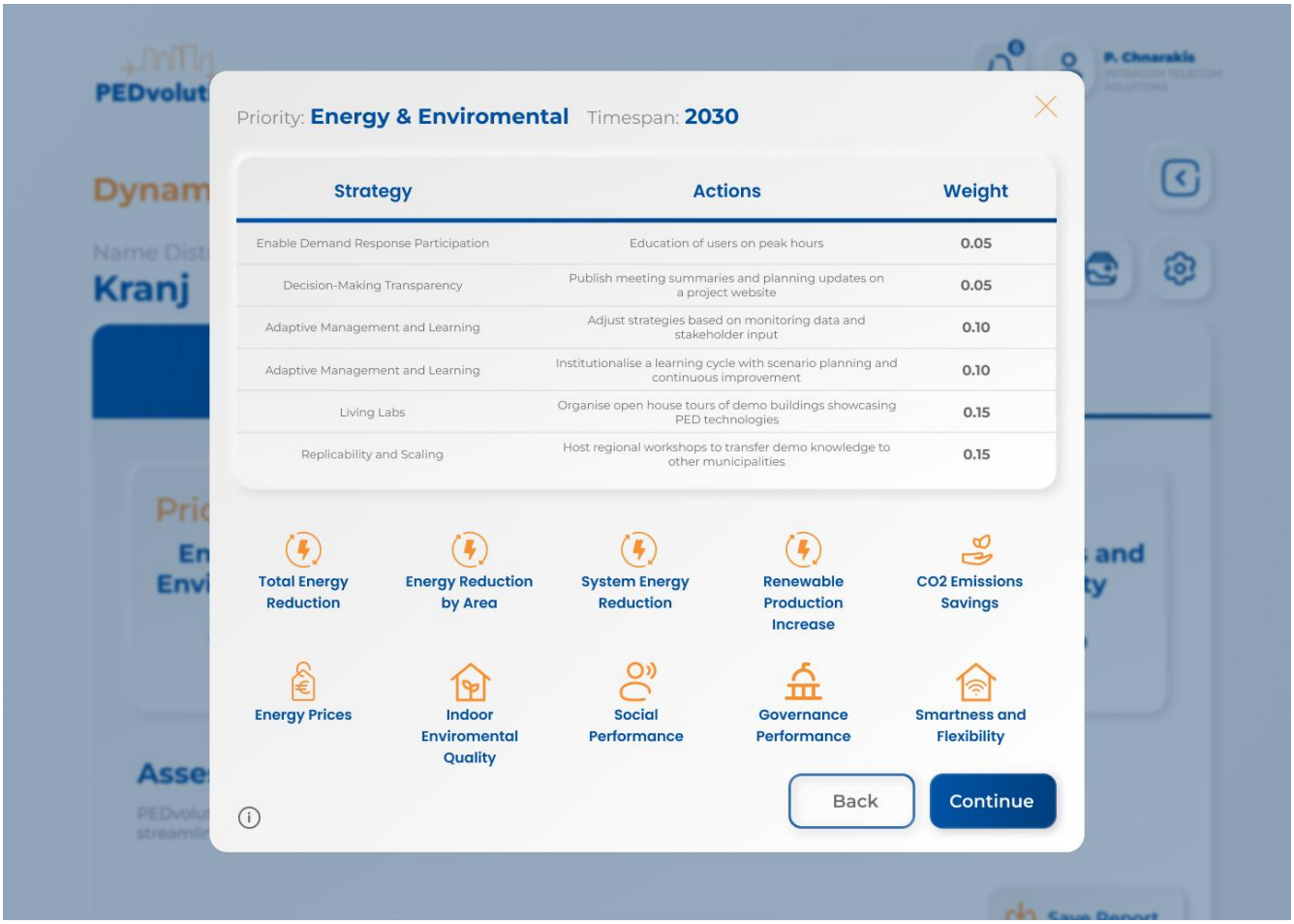


Figure 10: New scenario generation workflow (step 2).

Scenario Results

The generated scenario results are presented in Figure 11. This screen enables the PED Planner to review the updated assessment of the generated future scenario through graphical visualisations, performance indicators, and detailed results produced by the DDSG. The interface supports the interpretation of the projected impacts of the selected strategies and facilitates the comparison of the generated scenario with the baseline assessment, thereby assisting the user in evaluating alternative development pathways for the selected PED.

© PEDvolution, 2025

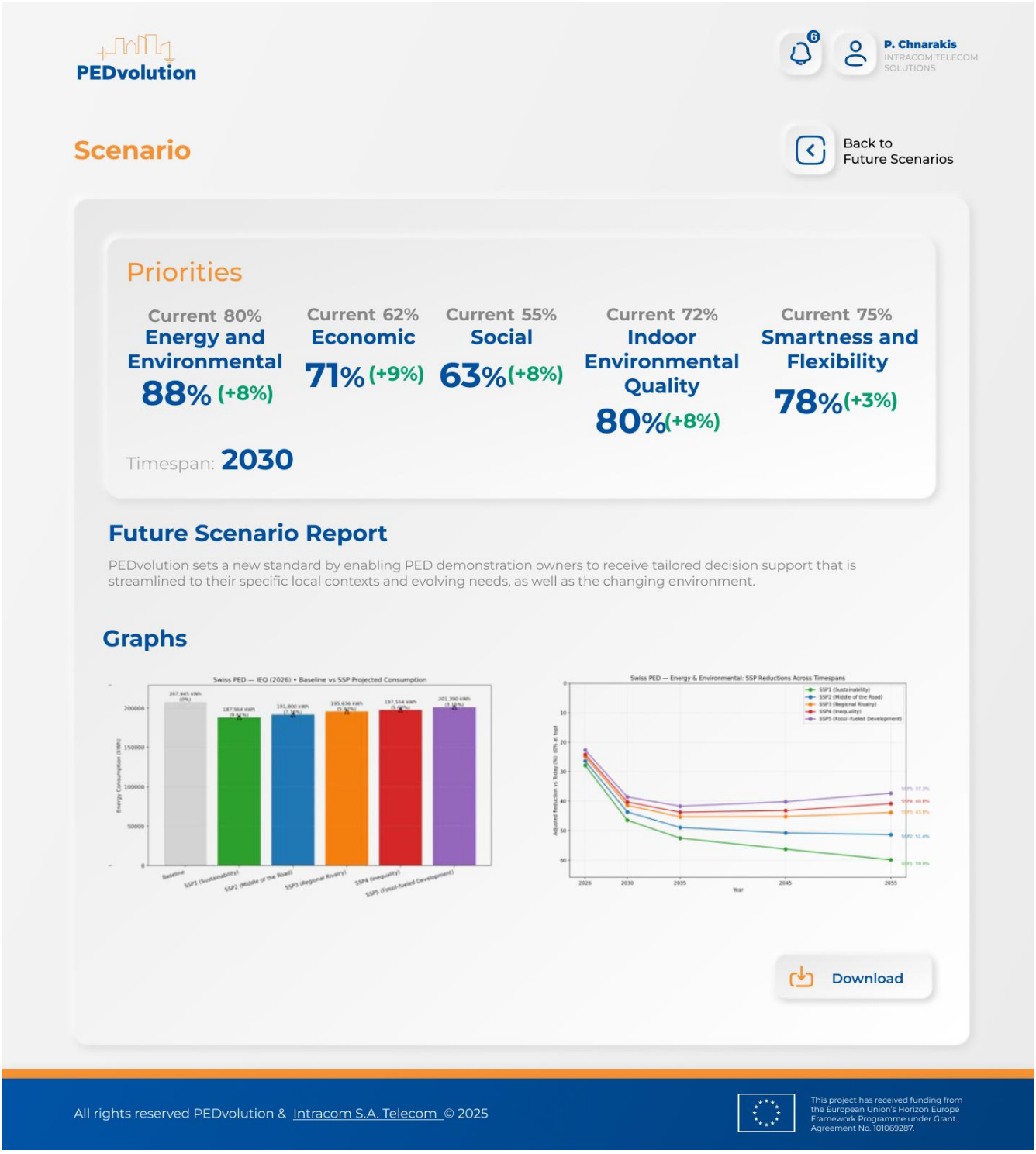


Figure 11: Scenario results.

4 CONCLUSIONS

This deliverable documented the design and implementation of the PEDvolution DDSG UI, developed as part of the PEDvolution CWA for PED Planning Tools. The DDSG UI provides PED Planners with an intuitive environment for interacting with the DDSG, enabling them to assess the current state of PEDs, generate future planning scenarios, and analyse the corresponding results and recommendations.

The work presented in this deliverable covered the complete design process of the DDSG UI, beginning with the analysis of the project requirements and the definition of the user workflows, continuing with the iterative development of the UI design in close collaboration with the DDSG solution provider, and concluding with the implementation of the application architecture and the final user interface. The architectural documentation, including the context, functional, and implementation views, provides a comprehensive description of the DDSG UI and its integration within the wider PEDvolution technical ecosystem.

The resulting application establishes a common and extensible foundation for supporting the decision-making activities of PED Planners through a modern web-based interface. By integrating the DDSG into the PEDvolution CWA for PED Planning Tools, the developed solution contributes to a consistent user experience across the project's digital tools while maintaining clear interfaces with the underlying DDSG.

The work presented in this deliverable also provides the basis for the subsequent demonstration and validation activities of the DDSG application within the PEDvolution demonstrators. Feedback collected during these activities will support the evaluation of the application in operational settings and may inform future refinements of both the user interface and the underlying decision-support workflows.

© PEDvolution, 2025

5 REFERENCES

[1] PEDvolution project, "D1.2 - Functional and Operational Requirements of the Demo Sites and Reference Use cases," 2024.

[2] PEDvolution project, "D1.3 - System architecture and technical specifications," 2024.

[3] PEDvolution project, "D4.3 - Specifications and plan for testing and deployment of PEDvolution decision support guideline," 2025.

[4] PEDvolution project, "D3.1 – Cohesive Toolchain for Integrated Modelling of PED via Digital Twin," 2025.

[5] "React documentation," [Online]. Available: https://react.dev/. [Accessed June 2026].

[6] "TypeScript documentation," [Online]. Available: https://www.typescriptlang.org/docs/. [Accessed June 2026].

[7] "Vite documentation," [Online]. Available: https://vite.dev/guide/. [Accessed June 2026].

[8] "Tailwind CSS documentation," [Online]. Available: https://tailwindcss.com/docs. [Accessed June 2026].

[9] "FastAPI documentation," [Online]. Available: https://fastapi.tiangolo.com/. [Accessed June 2026].

[10] "PostgreSQL," [Online]. Available: https://www.postgresql.org/. [Accessed June 2026].

[11] "SQLAlchemy documentation," [Online]. Available: https://docs.sqlalchemy.org/. [Accessed June 2026].

[12] "Docker documentation," [Online]. Available: https://docs.docker.com/. [Accessed June 2026].

[13] "GitLab CI/CD documentation," [Online]. Available: https://docs.gitlab.com/ci/. [Accessed June 2026].

© PEDvolution, 2025