

D4.2 Decision Support System



Deliverable Information Sheet

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History of changes

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1.1	20/06/2024	1 st Review	Ecoserveis
2.0	01/07/2024	Final version	Spindox Labs
2.1			
2.2			

List of Acronyms

COP	COMANAGE Open Platform
DSS	Decision Support System
EC	Energy Community
LLM	Large Language Model
UI	User Interface
UX	User Experience

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Keywords list

- Decision support system
- Open platform

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1. Executive summary

The Decision Support System (DSS) is a tool for supporting stakeholders and replicators in recovering useful information for decision-making processes in the management of energy communities' projects, facilitating the replication of best practices.

The DSS is a component of the COMANAGE Open Platform (COP), which is already described in Deliverable 7.4—Project *Open Platform*.

This deliverable describes the status of the DSS (M20), which constitutes its basic engine. It will be fine-tuned in the upcoming months when pilot documentation and the COP start functioning.

2. Decision Support System

The Decision Support System (DSS) should support users and policymakers in extracting useful information from the contents stored in the COMANAGE Open Platform (COP). Large documents in different languages can be parsed using the Large Language Model (LLM) and other techniques. The DSS can generate a response and link the related documents where it finds the information. This way, from a set of documents available in a shared folder, the DSS can automatically find the answers to related questions (**Figure 1**).

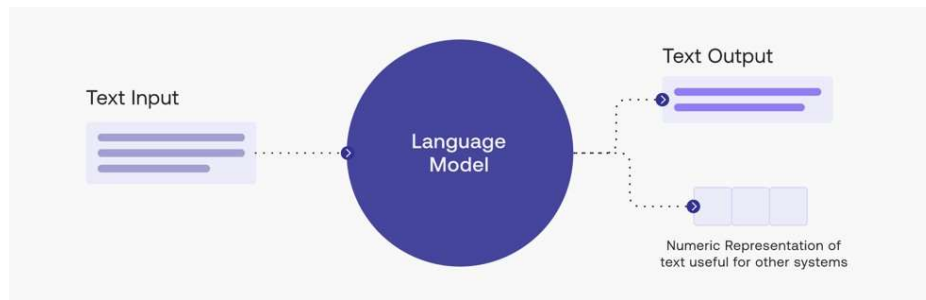


Figure 1. DSS functioning

During the brainstorming session in Athens, partners agreed to consider the DSS as a place where users can get answers on specific topics, linking simultaneously to the place to find further information. Based on this, SPXL drafted the following concept (**Figure 2**).

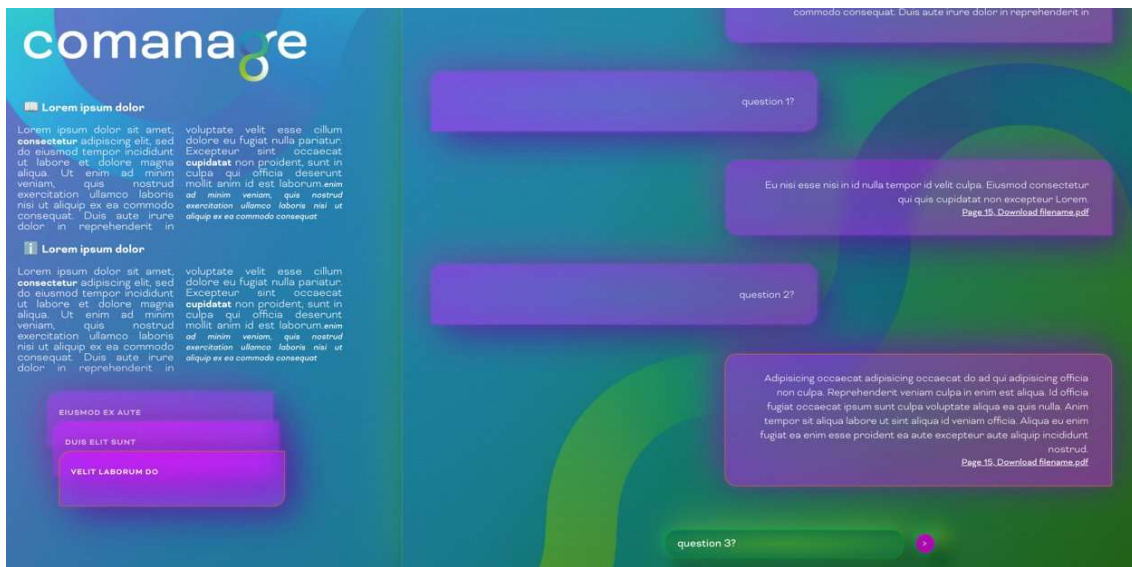


Figure 2. DSS Concept

2.1. Final Ui/UX

After an initial concept, a final version of the UX/UI (user experience/user interface) was shared with the partner and development started on a full working version.



Figure 3. DSS Final version, first step with cards



Figure 4. DSS Final version, second step with chat

2.2. DSS graphical components

There are four main components on the web page that allow the user to interact with the DSS.

2.2.1. Info Section

The Info section is the main tutorial and cheat sheet for using the DSS; here, pilots must create a text to brief the user and introduce the DSS. This section also contains the language buttons. By clicking on the rounded flags, the page will be reloaded with the selected language, and the chatbot will prefer to respond in the chosen language. The number of languages and the content of this component can be managed in the project's WordPress back-office website under the section "dss_info_section."



Figure 5. DSS Info Section with language buttons

2.2.2. History cards

Below the info section, there's a list of buttons that represent the steps the user has taken since opening the page or language. By interacting with the list of buttons, the user can return and choose different paths to the chat component.

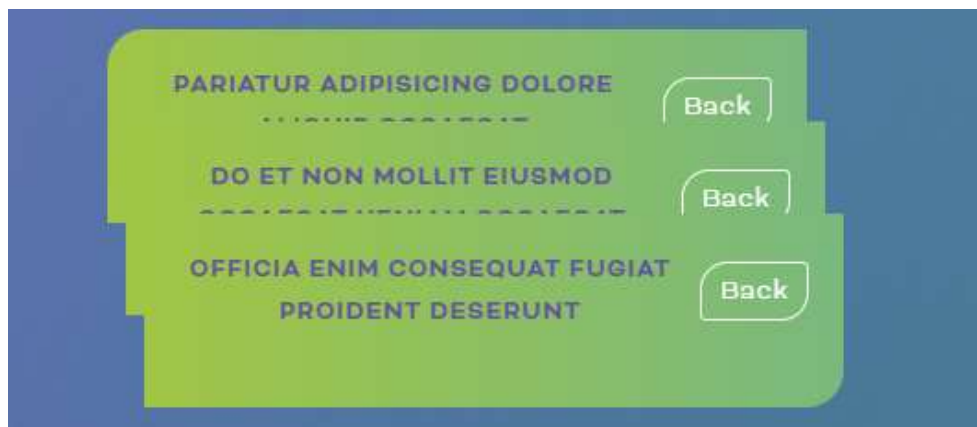


Figure 6. DSS history cards

2.2.3. Cards



Figure 7. DSS card

Cards are one of the critical features of the DSS. They are designed to guide the user into a specific topic with meaningful messages and provide the system with important information about what flavour the later chat conversation should use and what documents to choose from to create answers. Cards have a tree-like structure, and the decision tree can be configured in the WordPress back office in the dedicated "dss_card" section. Along with the usual metadata associated with the card, such as its title, textual content, and button text, there is also the associated language, action type, and ID. Language is the primary discriminator between cards; once the DSS web page is opened, the system will filter out all cards related to languages other than the selected one. The action helps the system to identify the first card to be displayed, and it can be either "start" or

"choose". The ID field contains the most crucial information and is one of the most difficult to understand in the DSS system, and it provides the position of the card within the decision tree. The following scheme shows how to create correct IDs and how cards are inserted into the tree.

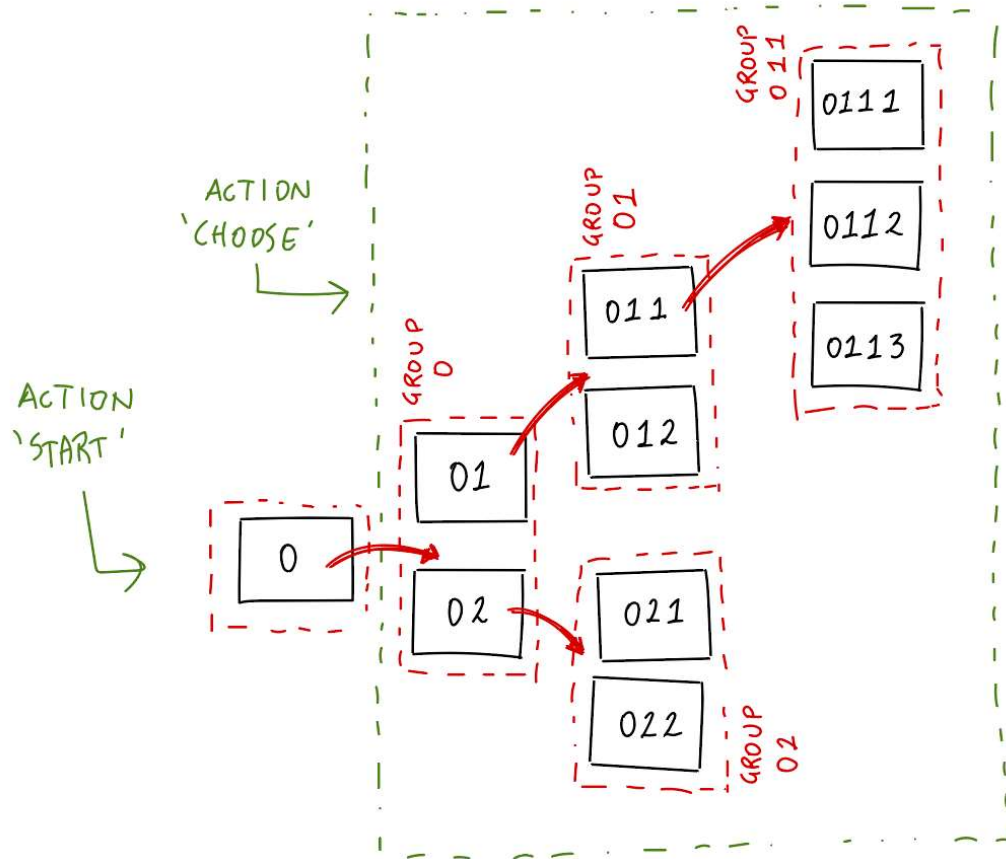


Figure 8. How the DSS tree structure is created by using the card IDs: the black rectangles are cards, and the text inside them are relative IDs, the red arrows represent the user clicks, and the red dotted rectangles are the cards grouped by their previous card.

As you can see in the diagram, there are two main entities in the graph: the card and the group. A good key to understanding how the IDs work is to look at the group ID and the card that leads to that group. For example, card 01 leads to group 01, which contains card 011 and card 012; the card ID holds the group position.

Important note: Due to the pilots' feedback, the tree card structure is not used now. Although the graphical components and the logic that manages its displacement are finished, the backend section that manages the DSS data collection has been simplified to avoid investing effort in features that the pilots did not find useful.

2.2.4. Chat component

Once the last nested card is clicked, the right part of the website will slide into the chat component to start the conversation with the virtual assistant. The chat section is made up of 3 components: (1) the chat messages, a user on the left and an assistant on the right; (2) the input field with the loader next to it; and (3) the green circle that scrolls the chat up and down. The message contains not only the assistant's text but also the link from which the text was generated; if users click on it, they will be taken to the corresponding document.

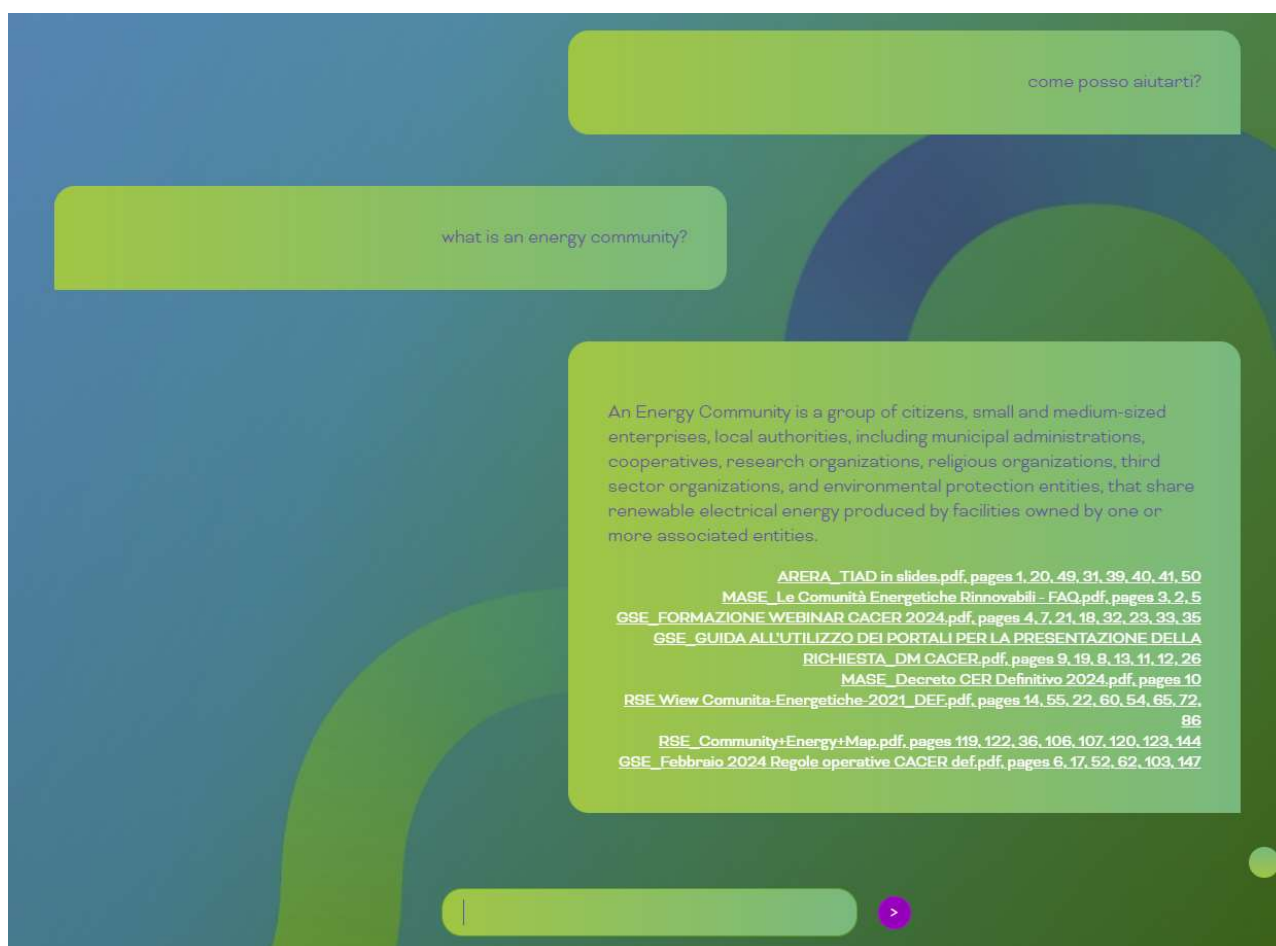


Figure 9. DSS chat component

2.3. Architectural overview

This section provides a general understanding of the process for displaying content in the DSS section, which involves Google Drive, ChatGPT, the COMANAGE vector database, the COMANAGE server, and the WordPress back office.

2.3.1. Question answer workflow

When the user opens the DSS section on the COMANAGE website, the WordPress back office will provide the correct information to fill in the textual component and create the card structure. Once a question is asked, the user's device sends the answer to the COMANAGE server, which searches the vector database for all the chunks of files that have a textual correlation with the user's question. Each text chunk carries metadata, such as the file name from which it was extracted, the language and the page number. If the user's language is English, all chunks will be used to create the answer. Otherwise, only the chunk with the correct language will be used; this is done to develop answers that are, for example, only related to a single state law. With the list of text chunks, the COMANAGE server will ask ChatGPT to create a finished sentence and then return it to the user's browser.

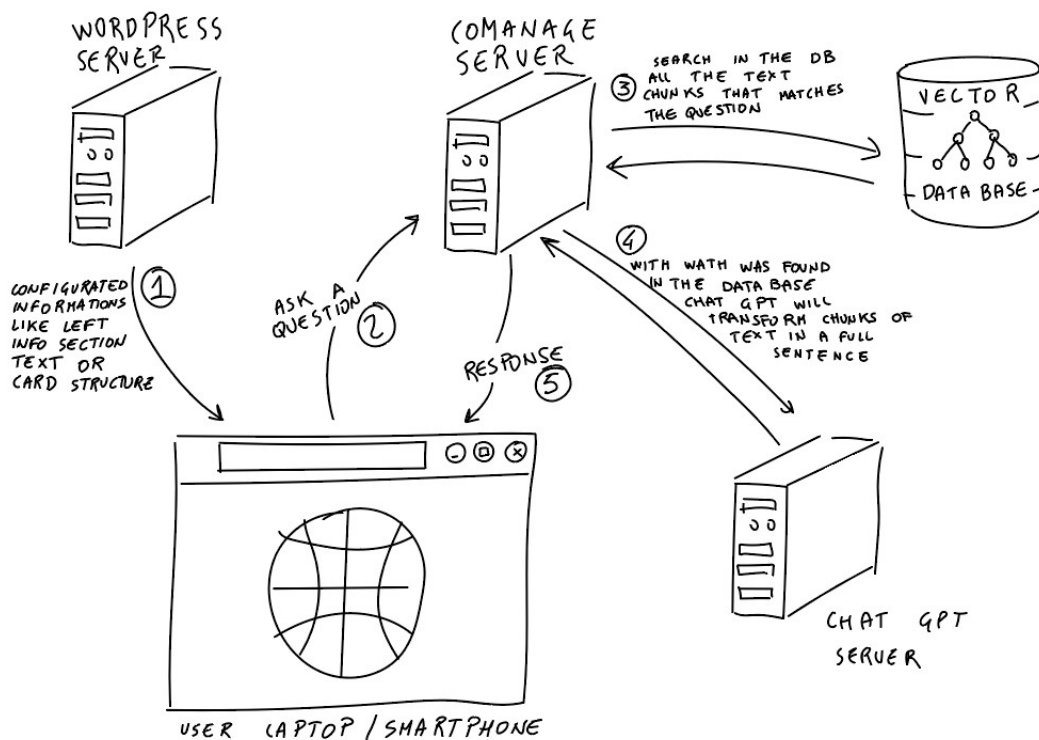


Figure 10. DSS question -> answer process

2.3.2. DSS Pilots feedback & updates

Although the feature was developed, the Polish and Catalan pilots decided it was unnecessary for the project. To better focus the efforts, the development of this feature was stopped, and the backend management that was still to be developed was avoided. The as-is for this part of the COMANAGE architecture was simplified. The original design was to provide each pilot with a drive folder to place files, and within the folder, the pilots could create subfolders to better separate content by topic. The map structure would reflect the sub-folder structure. It would not only help the website user to identify better the topic

that they want to focus on, but it will also help the DSS system pick the information only in the folder indicated by the last card, avoiding cross-picking references in potentially unrelated files.

2.3.3. Google Drive vector database alignment routine

The vector database and uploaded content within the Google Drive folders are automatically aligned every 12 hours. To facilitate a better understanding of the permitted file extensions and the folders in which they can be uploaded, a series of tutorials has been produced for Hub Managers to update the content that feeds the DSS. These are available in video and textual formats and can be accessed from the same Drive but in a different folder.

The permitted file extensions are as follows:

- *Microsoft/Openoffice word*
- *Microsoft/Openoffice excel*
- *Pdf*
- *Png*
- *jpeg*

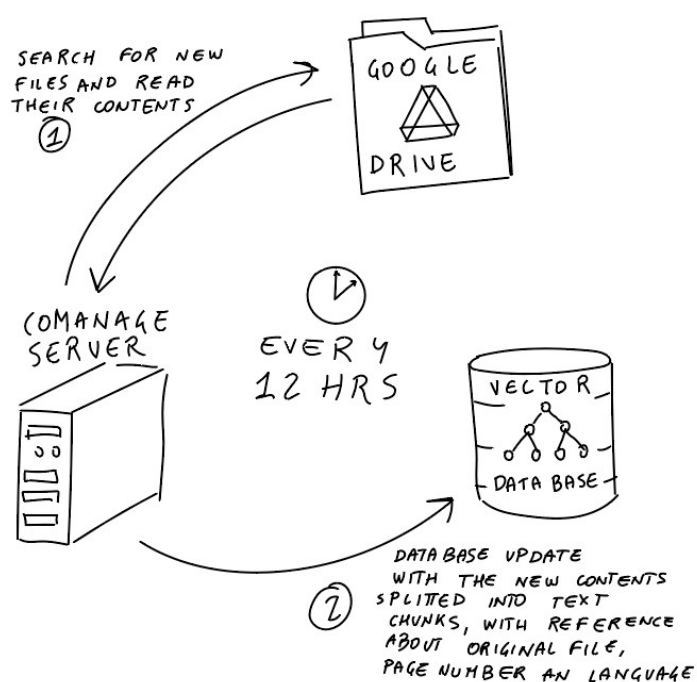


Figure 11. DSS vector database update automated steps