D6.1 Guidelines to investigate users' perceptions about the use of building data

MODERATE

Marketable Open Data Solution for Optimized Building-related Energy Services

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1. Executive Summary

Deliverable 6.1 (D6.1), *Guidelines to investigate users' perceptions about the use of building data*, provides a structured baseline for ethnography-inspired field research that will be conducted with all MODERATE industrial partners and external relevant potential used later in the market analysis and for validating the potential users of KERs (Key Exploitable Results). It identifies the aim of the study, the outline of the research process, key research topics and questions, research participants, and specific guidelines on how to apply the selected qualitative research methods, further providing guidelines on data reporting and analyses, including relevant templates.

This deliverable incorporates the methodological basis for discovering the end-user perspective and the end-user story of the MODERATE platform. A focused and designed ethnographic-inspired approach focuses on the key topics that allow understanding of the needs of the different target groups and their perspective to include them in improving the set-up of the project.

The primary goals of the document are as follows:

- Identify the vision and values of the target groups.
- Identify and categorise the needs and expectations inside the organisations' processes towards data-driven tools.
- Identify the relationships between the different target groups concerning building data requirements.

The present report is the result of the research activities about the perception of the key stakeholders about MODERATE Open Building Data Marketplace, led by HUYGEN and TU Wien with the support of involved industrial partners. The methodology guidelines are tested and fine, including focused ethnographic research in the context of MODERATE's potential users and their relations. Given the required information from this deliverable, it will be used in the co-design phase. Further, demo cases are shaped in the co-creation workshops based on their regional ecosystem (Valencia region in Spain), municipality ecosystem (Crevillent, a town within the Valencia region), and national ecosystems (Italy, Germany, and Spain). Therefore, the contribution from industrial and related stakeholders involved in the development of this document is relevant and has been done through task force meetings, working sessions, and interviews.

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2. Introduction and overview

The *Guidelines to investigate users' perceptions about the use of building data* provide a common ground for exploring through ethnographic-inspired research the actions of the co-design phase to define the key features of the MODERATE marketplace with all the industrial partners. The document includes a detailed methodology, guidelines, and templates to help partners to conduct qualitative research. Additionally, the document can be useful for internal and external stakeholders as methodological support for planning and conducting research and analysis in the field of data-driven services in the built environment.

This research is prepared based on robust expertise in the built environment and experience integrating ethnographic explorations into energy-related digital platforms in Horizon 2020 projects. The content is co-developed by engaging with the relevant partners from different WPs in the MODERATE consortium. These engagements included internal meetings with consortium members (e.g., first General Assembly) and Grant Agreement (GA) definitions and preliminary conversations with the industrial partners where their expectations from MODERATE allowed the key topics and research questions to be delineated.

This chapter gives an overview of the role of qualitative research in understanding the context of the end-user approach in big data platform development. Starting with an overview of qualitative research's role in data platform development, then looking at the influence of applying field research to the MODERATE project. Finally, the chapter gives an overview of the effect of these guidelines on other Work Packages (WP) and the following chapters' content, purpose, and logic.

2.1 The influence of field research on (the development of) integrated big data platforms.

The definition of a big data platform is not unambiguous. One of the definitions used in the literature is that a big data platform integrates the internet of things, big data, and cloud computing (Luo, et al., 2019). These three entities configure big data, which can improve processes in the energy field.
Nevertheless, literature also shows how innovation is a **socio-technical** system where society and technology are mutually shaping one another, in contrast with definitions that consider innovation a merely technical linear process (Geels and Schot, 2007; Loorbach and Verbong, 2012). This socio-technical system enables the uptake and design of such platforms, so the definition of innovation, in this case, becomes relevant. Innovation is a complex system that, apart from technical challenges, implies individual values, needs, and expectations that coexist and are in ambivalent relation: competing or leveraging each other. Additionally, innovation processes are also intertwined with the ecological system to make things even more intricate.

It can be affirmed then that Humans play a big role in the design process (Verganti, Vendraminelli, & Iansiti, 2020). From this point of view, the end-user is an essential stakeholder. End-users should determine the characteristics that the platform ought to require. Otherwise, the platform would have no sustainability (Roterberg, 2018). The sustainable relationship between the end user and the platform must be protected. This could be done in the first place by defining the platform's key features and functionalities, which requires empathy and engagement with the end user. The latter is only possible through a continuous reflection process in which the end user shall be understood (Verganti, Vendraminelli, & Iansiti, 2020). This can be done by co-creating with them while acquiring relevant qualitative data. The researcher's relationship with the research environment is one of the critical factors for good qualitative research.

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Field qualitative research, then, is a method in which the researcher goes to the field and analyses the environment (Müller, 2021). The goal is usually to collect qualitative data. Nevertheless, this method is divided into many sub-approaches. The two categories are fundamentally distinct from each other. Classical ethnography in the tradition of the Chicago School is characterized by prolonged immersion in the field, openness, and description of impressions and experiences (Müller, 2021). Focused ethnographies are practised in applied areas such as architecture, commerce, marketing, Human-Computer-Interaction and, Computer Supported Cooperative Work. The goal of focused ethnography consists of implementing a new technology, a system design, an artefact, a building, etc. (Müller, 2021). Another difference between focused ethnography and classical ethnography is the difference in time, experience, and data intensity. First, classical approaches are time and expertise intensive, while focused methods are data-intensive in the business context - innovation (Müller, 2021). This may take only one or even half a day. In addition, ethnography engages in the context of design. Therefore, it has been important to implement new technologies in workplaces. This design ethnography has a user-centred design: The focus is on the user's environment and point of view (Müller, 2021) (Verganti, Vendraminelli, & Iansiti, 2020).

The above makes field research, particularly focused ethnography and design ethnography, relevant to the methodological structure of D.6.1. guidelines. Combining new technology, innovation, and user-centred design.

2.2 The role of field research in the development of the MODERATE platform

This section highlights the methodology and its aims. It also shows the relation between this work package (Demonstration) and the others in relation with this deliverable.

2.2.1 MODERATE methodology and objectives

A user-centred approach is embedded into the overall methodology of *Demonstration* WP6 and all of its tasks (see Grant Agreement, page 56).

Aim

1. To characterize the stakeholders and explore the design and implementation process of the MODERATE platform from a user-centred perspective, focusing on the following:
   - Drivers
   - Barriers
   - Interpretations of their needs and how the MODERATE platform addresses them.
2. To configure a collection of key topics that can be further developed along the project and tested concerning compliance with selected end-user organisations’ ecosystems.

Key Expected Results

1. Guidelines (methods and templates) to investigate users’ perceptions about the use of building data.
2. A baseline of relevant indicators and key topics that the platform can provide and implement within potential user organisations.

These supporting tools are aligned to facilitate the mapping of the industrial partners and to foster the formation of the demo case of each key stakeholder group. Such target groups are defined as

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relevant agents or groups connected to the demo cases, which could be potential users of MODERATE services (e.g., policymakers, building product and technology manufacturers, building owners, investors, designers, facility managers, insurance companies, DSOs, financial bodies, etc.). After the mapping, their user stories should be characterized. These stakeholders will be engaged throughout the subsequent activities in WP6 (*Demonstration*) and WP7 (*Exploitation*) as potential users as co-designers and testers of the marketplace.

Report on users' perceptions:

This report collects feedback from the industrial partners based on questionnaires, interviews, and co-creation workshops as input for the identification and (first) definition of the key features and analytics of the MODERATE platform. While the focused and design ethnography approach will be an added value to the above key expected results of WP6, it also provides peer-to-peer feedback in the pilots, and new strategic, tactic, and operational insights for pilot stakeholders. In addition, including recommendations about the sustainable use of data and new technologies/innovations, tips on how to ensure a design thinking process that enables continuous alignment and interaction with users, how to make prototypes and arrangements better matched to end-user needs (sustainability, infrastructure, cost-effectiveness, and co-creation).

Relation with other MODERATE objectives

A design ethnography approach, therefore, influences several overall objectives of the MODERATE project, most directly to:

Objective 1: To stimulate the co-creation and widespread implementation of building big data platforms.

Objective 2: To define a methodology for extracting information-rich open datasets from closed/commercial data owners. Guaranteeing the early discovery and continuous assessment of ethical and legal issues concerning synthetic and open datasets, research outcomes, and data produced through participatory methods involving communication target groups.

Objective 3: To demonstrate the effectiveness of the services resulting from the platform on real users from our target groups, especially within the Consortium.

2.2.2 Focused and design ethnographic research in Demonstration work package

There are three phases of focused and design ethnographic research conducted within WP6. The first phase falls within the analysis of stakeholders' perceptions about MODERATE Open Building Data Marketplace (T6.1) and includes focused ethnographic research through interviews and questionnaires with industrial partners. In addition, the research includes interviews between the industrial partners and their target group of stakeholders that serve as input for the demo cases:

- 12 semi-structured, in-depth interviews with the representatives of the industry organisations in the consortium.
- Two co-design workshops with the same actors identified in the interviews.

The second phase is the Co-design phase to define the key features for the MODERATE marketplace (T6.2) in two co-design workshops. These workshops aim to collect qualitative feedback from the end users' perspectives on the key features and functionalities of the marketplace. The feedback brings new ideas which improve the development of the mock-up of the platform. Also, the key features set up in the first phase validate the results of the co-design process of workshop one. Finally, optimize the key features. The outcome of this workshop gives information for the drafted MODERATE platform architecture and the Apps and Services specifications defined. This will facilitate the development of the mock-up of the platform. In the second workshop, the end users related to the demo cases validate and (re)define together the mock-up of the platform with the consortium partners.

The third phase consist of the demonstration of the MODERATE Open Building Marketplace in real-use cases and the implementation of Use Case Action Plans. MODERATE key features and functionalities are determined for the real case scenario – the complete prototype with services and apps will be tested and evaluated in the demonstration cases following the protocols defined. This task involves a small group of consortium partners and a selected target group. To collect qualitative information in the form of feedback from multiple users' perspectives. To optimise the key features and functionalities like the services and apps of the platform. The marketplace will be demonstrated in real use case scenarios.

2.2.3 Field research and other Work packages

The outputs of qualitative research have input into other WPs, as the end-user's approach is integrated into the overall project methodology. These choices impact the structuring of qualitative research inside the project. Field research elements, such as focused and design ethnography elements of MODERATE, contribute to:

Table 1: Connections between WP6 and other Work Packages

WP	Task	Inputs expected from WP6	M
WP2	2.1 Platform architecture	Identified information related to the main components of the platform architecture and the communication flow. Which communication and components are preferred by the data providers interviewed in T6.1?	1-7
WP2	2.1 Platform architecture	The identified needs of the industrial partners translated to the deployment of the services (open-source or private cloud services).	1-7
WP2	2.2 Storage Layer and Analytics platform	Feedback from the target groups in T6.1 and T6.2, based on their analytics needs.	8-13
WP5	5.1 Analytics for buildings	Feedback from interviews T6.1, feedback from demo cases in co-creation workshops and feedback from real use cases T6.4.	1-39
WP5	5.3 Services Implementation	Feedback from the real use cases in T6.4.	34-39
WP5	5.4 Continuous deployment and evaluation	Feedback from the real use cases in T6.4.	24-39
WP 7	7.1 Market analyses	Analysing the target groups' market and their needs. Which applications and services have potential, and which do not? This is the first step in defining the potential and barriers of the (niche)markets.	1-14

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WP7	7.2 Validating potential uses of KER's	Interaction with Target groups by doing in-depth interviews inside T6.1 and co-creation workshops in T6.2.	1-14
WP7	7.3 Business models development	Interaction with industrial partners by in-depth interviews T6.1 (focusing on cost-effectiveness) and defining the demo case and mock-up of the platform T6.2.	1-14

2.3 Table of contents of the guidelines

This section shows the chapters that guide the researcher through the qualitative research process. It will guide task leaders with ongoing support from the WP6. The table below gives an overview of materials and guidelines.

Table 2: Overview of D6.1 guidelines and materials

Chapter	Brief Explanation	How to use it
3. Outline of T6.1 activities	Summary description of the activities to be conducted as part of T6.1	Get to know the upcoming activities which are scheduled for T6.1. To see individual needs and context of the (sub)tasks.
4. Key research topics and questions	Research partners will attempt to answer the questions by analysing and interpreting qualitative data gathered.	Read and understand the topics and questions. Use them to structure the conversation and results (interviews and co-creation workshops). After an (individual) research activity, information can easily be placed in context (analysis).
5. Identified Users – Target group stakeholders	Schematic overview of stakeholders and an explanation of the approach of (potential) stakeholders.	An explanation to discover and approach potential stakeholders for interviews and co-creation workshops.
6. Research methods Guidelines	Tips and guidelines for planning and delivering semi-structured interviews and co-creation workshops following a step-by-step approach from planning to reporting	Hold them (Print them out if it is of added value for the research process). Use them as a checklist when preparing for research activities.
7. Analysis and reporting	Summary of the outline of the analysis process	Keep them handy when the obtained information is analysed.
8. References	List of all related literature of the research in T6.1 and T6.2.	Use the APA to find the literature on the internet for more context about information in the guidelines (D6.1).
Annexe 1: Interview Template	The template of interview questions (T6.1) for the industrial partners inside the MODERATE project and their target group of stakeholders. (Utility companies, energy/facilitate managers,	The template shows how an interview can be structured and proceeded. There is a possibility to adapt the questions and content to the main research themes and specific questions related to the research participants (stakeholder group, (personal) background experience, country, and context). Print them

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	policymakers' real estate, and ESCO).	and bring them to the activity as a "backup" (to glance over if needed).
Annexe 2: User persona	The template for analysing and structuring the end user needs of the industrial partners and the external stakeholders. This includes all participants in the interviews and co-creation workshops.	The template gives a method/tool to structure information from interviews and co-creation workshops. The data will be structured by keywords and is related to the specific participant(s) and their organisation (s), the first draft of the user stories and the beginning of the user journey.

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3. Outline of activities

Chapter 3 highlights the scope of the research and describes the process.

3.1 Scope

The research process in analysis of stakeholders' perceptions about MODERATE Open Building Data Marketplace (T6.1) and the definition of key features for the MODERATE marketplace (T6.2) will involve all industrial partners and target groups through two research methods: semi-structured interviews and co-design workshops. In coordination with the task leaders and industrial partners, these will be customised according to their organisational ecosystem, considering their context, availability and access to stakeholders. Interviews will be conducted based on adaptive interview formats and coordination between the interviewer and task leader. Co-creation workshops will be designed considering the outputs of the mentioned interviews, as mentioned before, assuming an overall user-centred approach integrated into the comprehensive project methodology.

The field research in the analysis of stakeholders' perceptions will consist of semi-structured interviews based on focused ethnographic research. The related demonstration case holder or industrial partners will complete these tasks. Below is the list of industrial partners:

- Energy/Facility Management (WUERTH, SYNAVISION)
- Utility Companies (ENERCOOP)
- Territory governance and policy maker (IVE)
- Real Estate development and exploitation (KÖHLER)
- ESCO/ Energy performance contracting (VEOLIA)

In the definition of the key features of the MODERATE marketplace, each end user from the semi-structured interviews of stakeholders' perception analysis is invited to outline the user perspective by participating in the co-creation workshops. This gives the same stakeholder different points of view. The first point of view approximates what the platform can deliver, and the second one enables a discussion on if what can be offered is what can be implemented.

TU-Wien considers in the first co-creation workshop the findings of the first and second rounds of interviews. Validating the analytics of MODERATE and the needs of the specific target groups found in the interviews. The second workshop is about testing the platform's mock-up using participants' real-time feedback. These are the chosen stakeholders from the first analysis, including the industrial partner's knowledge, expertise, network, origin, and relevant situation.

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3.2 Working Process

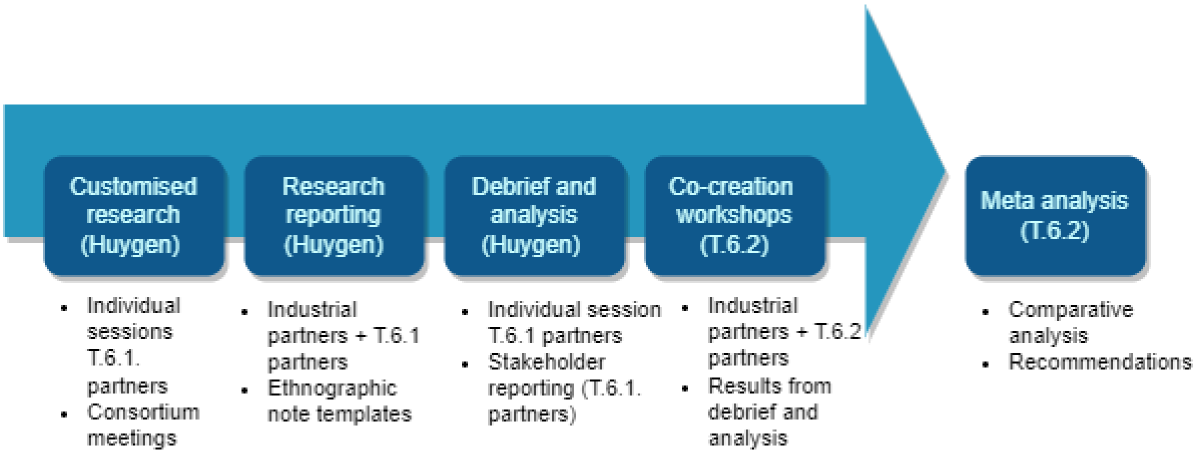

Figure 1: Outline of the T.6.1/T.6.2 working process

The customised research is done in individual sessions with the members of the stakeholders' analysis in T6.1 (Huygen), which implies literature research, consortium discussions and in-house expertise to provide relevant topics that support the methodology and key topics. After analysing relevant literature, HUYGEN makes the first steps in designing the instructions and guidelines to approach and analyse the end-users. This process is streamlined by preparing a first draft of the guidelines based on ethnographic research for approaching the stakeholders. From the conceptualised guidelines and methodology, Huygen conducts semi-structured in-depth interviews with all the industrial partners considering the delineated customised methods depicted in this document. After the research reporting process, using the templates, the collected information can be debriefed and analysed by Huygen using the defined methodology initially customised for this endeavour. Results from this analysis contribute to the co-creation workshops, which will facilitate the analysis and first recommendations for developing the MODERATE Open Data Building Marketplace and its features.

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4. Key research topics and questions

The critical research topics based on the MODERATE objectives and interviews with the industrial partners delineate the qualitative research required for the MODERATE project.

The ethnography-inspired research within the MODERATE project **aims to provide recommendations and identify crucial factors and indicators** for supporting the sustainability, infrastructure, cost-effectiveness, and co-creation processes depicted in the MODERATE objectives. The qualitative research in MODERATE will address the following aspects:

- The alignment between the six capital values of the organizations interested in the MODERATE marketplace with the project objectives.
- Describe the user needs and expectations for the possible adoption of open data solutions (and its impacts within the organization).

Gathering qualitative data allows us to formulate recommendations and identify crucial project development needs and expectations. This research focuses on opinions (perceptions). It explores the practices, experiences, and conditions (needs) of the key target stakeholder groups (utility companies, energy/facility managers, real estate companies, policymakers, and ESCO). The focus is also to identify the barriers and enablers and the similarities and differences between the key target stakeholder groups. It is important to mention that the aspects listed below are not equally relevant for all stakeholder groups. The focus may vary depending on the organization's place in the market and the role of the interviewee (e.g., a top management representative may focus on the organizational perspectives and less on technical interpretations).

- Perceptions

are an individual's conscious interpretations of a particular aspect and their specific reasoning behind it, their view on certain things (from their moral compass) and their substantiation in these matters, such as worldview, values, persuasions and motivations.

- Practices

are activities tied to a specific aspect and involve different objects, knowledge and meanings and relationships behind them. The actions the stakeholder goes through within the processes, from developing/co-creating the platform to using it.

- Needs

These are standard requirements that can be or not satisfied. These requirements can be consciously identified or not. Usually, needs can become visible when exploring everyday practices.

- Barriers

The obstacles such as materials, processes, institutions (i.e., formal and informal rules), Individuals and organisations, etc., which prevent, hamper, or could in future prevent a smooth set-up, operation, or evolvement of the MODERATE platform objectives; identified by the (industrial) partners and qualitative data analysis.

- Enablers

The materials, processes, institutions (i.e., formal and informal rules), individuals, organisations, etc., have supported the development and running of the MODERATE platform or could do so in the future. As in the case of barriers, the stakeholders may identify enablers through qualitative research data analysis.

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Below is an overview of the utilised key topics and a list of related sub-questions. These key topics are addressed into two main groups focusing on the two main aspects mentioned at the beginning of this chapter. The first section is *MODERATE objectives and organisation values*, related to a high-level exploration of the MODERATE goals and the capital values within the organisation. In a second instance, at a lower level, is the section *MODERATE analytics and value chain exploration,* identifying the key processes within the organisation and relevant indicators for the MODERATE project development.

4.1. MODERATE objectives and organisation values

Formulated in the MODERATE Grand Agreement, the consortium aims to contribute towards the energy transition and MODERATE's five objectives. Therefore, the researchers discussed in a brainstorming session the needed key topics towards these ideas related to the stakeholder's organisational value. This meeting defined four key topics: *sustainability, infrastructure, cost-effectiveness, and co-creation*. The analyses of stakeholders on the four key topics need to be integral and comparable.

The integration of the values of an organisation is based on **universal** values, considering the planet and society. Multiple values can be categorised based on a broad range of standards developed in the last century. Therefore, the researcher needs a standardisation which integrates the values inside the company's business model, including certain borders. Inside the six-capital approach from the Integrated Intellectual Reporting Council (IIRC), each value has unique aspects intertwined with the other values. It is possible to categorise stakeholders using the six values and critically analyse their relations and the relevance of these values in the organisation. This literature has certain borders for structuring the analysis process of the 'People', 'Planet' and 'Profit' of an organisation and asking questions related to the mission, vision, strategy and activities.

The MODERATE objectives brainstorming allows for establishing the four key topics and sub-questions. Additionally, the six capital values support the analysis and reporting on an organisation's strategic mission, vision, strategy and activities.

4.1.1. Six capital values

The capability of MODERATE's integral business model, including the vision of the industrial partners and the adaptation of their business model, depends on the input of the six capital values described below following the definition of the IIRC's Prototype Framework (ACCA; NBA, 2013):

Financial Capital: The pool and funds available for an organisation, including debt and equity finance. The financial capital description focuses on the source of funds rather than its application which results in the acquisition of manufactured or other forms of capital.

Intellectual capital: The intangibles that provide a competitive advantage include intellectual property, such as patents, copyrights, software, systems, procedures and protocols, also intangibles associated with the brand and reputation that an organisation has developed.

Manufactured capital: Manufactured physical objects (not virgin materials) that are available to the organization for use in the production of a good or the provision of services, including buildings, equipment, and infrastructure.

Social and relational capital: The institutions and relationships established within and between each community, group of stakeholders and other networks enhance individual and collective well-being.

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This includes common values and behaviours, key relationships with external parties, and the organization’s social licence to operate.

Human capital: The people, skills and experience, and their capacity and motivations to innovate inside an organisation. Including their alignment with and support of the organisation’s governance framework and ethical values, such as its recognition of human rights, the ability to understand and implement an organizational strategy, and the loyalties and motivations for improving processes, goods and services, including their ability to lead and to collaborate.

Natural capital: The input to the production of goods or the provision of services. An organisation’s activities also positively or negatively impact natural capital, including water, land, minerals and forests, and biodiversity and ecosystem health.

4.1.2. MODERATE objectives’ key topics

The contribution towards the energy transition in Europe is the core value of MODERATE. This core value has been extracted from the GA and the five related objectives of the project. The four topics that define this core value were defined in the brainstorming sessions conducted as part of the preparation for analysing stakeholders’ perception of the MODERATE Open Building Data Marketplace, with the energy transition as a central theme.

As the aim is to find the needed values for transition, sustainability was defined in the first instance. In addition, the infrastructure as a key towards this goal, including a co-creating process with different disciplines and the same mindset towards cost-effectiveness and value creation, were delineated.

Topic 1: Sustainability

Fundamental components of sustainability are the energy transition, the material transition, and the process transition. With MODERATE, the platform wants to respond to this process's energy consumption, material consumption, and efficiency. How do the industrial partners and the target group of stakeholders assess these sustainable solutions of the MODERATE platform? What is their opinion about sustainability? Are the target groups only participating for financial gain, or is there an underlying intrinsic motivation for sustainability? And what values underlie this?

Perceptions	• How is sustainability integrated into the stakeholder values and worldview? • Are their values and persuasions in line with their actions? • How does the stakeholder describe sustainability, and which solutions make the platform more sustainable from the stakeholder’s point of view?
Practices	• How does the platform affect the stakeholders’ sustainability in their daily activities? (Personal and professional) • How does this affect the environment of the stakeholders? (Their stakeholders) • Are there any examples of sustainable integrated data platforms? And how are they cooperating? • Were there already collaborations in the field of sustainability between or/and by the stakeholders? • Which practical solutions of the platform link with one or more values of the six-capital model of the IIRC?

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Needs	• What information, knowledge, network, and institutions are needed to get the stakeholders on the same level within sustainability and their principles? Do their sustainability activities align with their strategy and beliefs?
Barriers	• What could hinder the sustainability of the platform and the related stakeholders? And what is the relation between these two? In addition to the six-capital model?
Enablers	• Which factors increase the sustainability level of the (MODERATE) platform and its stakeholders? Why and how will this improve? Which parties should be involved?

Topic 2: Cost-effectiveness

The cost savings on energy consumption, material use and other capital (Aras & Williams, 2022) that the platform's tools jointly deliver for the target groups versus the stakeholders' perception of the investment costs in the platform or the service costs. Therefore, there must also be a specific measure to identify the tools with the highest cost savings (potential) for each stakeholder. This allows for delivering a small set of tools for stakeholders' needs, and that would make it more interesting for investors on the platform.

Perceptions	• Do the different stakeholders perceive the platform as cost-effective? How do they explain and prove the argument of cost-effectiveness? • What are the differences between perceptions of different stakeholder groups, i.e., for whom is it (not) cost-effective? • How do we define the different stakeholder groups' cost-effectiveness with the six-capital model in mind? • Is there a pattern between the answer on defining cost-effectiveness (previous question) and the values and persuasions of the stakeholder?
Practices	• How, when and what tools can cost-effectiveness of individual aspects be monitored and brought together on an integral dashboard? • Is there any tool that measures the multiple value creation of cost-effectiveness (looking at the six-capital model approach)? If not. Is there a possibility of integrating this? • Which actions are undertaken to enhance the perceived or monitored effectiveness?
Needs	• Which aspects of the (MODERATE) platform's cost-effectiveness should be improved?
Barriers	• What do the different stakeholders experience as preventing the (MODERATE) platform from being cost-effective? And can this be related to one or more values of the six-capital model?
Enablers	• Which elements (materials, individuals, organizations, circumstances) contribute to or enhance the cost-effectiveness of the (MODERATE) platform? And can this be related to one or more values of the six-capital model?

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Topic 3: The structure of the platform

This topic comprises the platform's structure based on user-friendlessness and acceptability of the features and functionalities such as appliances, apps, services, and the integration between these categories. The acceptability of the platform is separated into two aspects: reliability and credibility, and the consortium must guarantee these. Therefore, the industrial partners and target stakeholder groups should be able to provide feedback on these points. In addition, the end user is central to design thinking, strengthening goodwill for the prototype.

Perceptions	• Which elements of the platform do the different stakeholders see as defining the platform (like other related technologies, tools, open use, and contracts), and how do they perceive them in terms of being user-friendly? Is this in line with their persuasions, values, and worldview? • Which services support the set-up or functioning of the platform, and how smoothly are they proceeding? What are reliable and credible values for the stakeholders? What is their expectation of the features and functionalities of the platform? • Does the platform contribute to the persuasions of the stakeholders and their worldviews? • Are the concept and ideas of the consortium accepted by the stakeholders?
Practices	• Which technologies or other materials and tools related to the platform do the stakeholders need to use regularly? How are they used, and why? • Who is responsible for which task within the running/operation of the platform and the possible expansion in the future?
Needs	• What are the difficulties experienced and expected? (Like understanding the information on the platform or working with his features)
Barriers	• What are the expected barriers (Network, contracts, communication structure, practical knowledge of individuals) in setting up and running the platform? • What probably prevents existing technologies, services, or day-to-day functioning of the MODERATE platform from becoming user-friendlier?
Enablers	• What/who could have a crucial role in removing any barriers? • What could make processes related to setting up, managing, or day-to-day functioning of (MODERATE) platform user-friendlier? • Which factors (materials, network, individual expert, institutional knowledge, organization, etc.) have so far improved the acceptability of (MODERATE) and how?

Topic 4: Co-creation

The participation of different stakeholders in the decision-making process (in use) of the MODERATE platform (e.g., implementation of apps and tools, collective investment in research, future orientation on a wider scale of opportunities), as well as aspects of control, access, and equity.

Perceptions	• How do the different stakeholders perceive the decision-making process related to the platform? Which values and persuasions underlie this?

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	• What have been the key drivers and motivators of the different stakeholders for initiating MODERATE and becoming engaged? • How do they envision the process in the future? What do they want to achieve? Which values are central?
Practices	• Who are the founders of the concept idea of MODERATE, who was involved, and how and why? What were their common values? • What should the decision-making process be like, and which stakeholders must be involved on which level? • Which aspects (organizational, communication structure, technological, policy etc.) should influence the decision-making process and how?
Needs	• Which needs of the different stakeholders remain unaddressed in decision-making? (Desired/required level of engagement) • What information, structures, institutions, or organizations are needed to improve the acceptability of the platform?
Barriers	• What do the different stakeholders think and already have experience as possibly hampering the decision-making process? • What hinders the acceptability of the (MODERATE) platform for the different stakeholders (Access to information, access to expert knowledge/network, insufficient communication (structure), organizational issues…)
Enablers	• Which elements (materials, individuals, organizations, circumstances...) could be seen as supportive of the decision-making process?

4.2. MODERATE analytics and value chain exploration

Exploring an organisation's need to implement data-driven solutions, on the one hand, requires three main issues: (1) a clear overview of how the organisation is configured, (2) an understanding of the possible analytics that can be provided by the MODERATE project and (3) the type of information needed from the data.

4.2.1. Business Model Canvas key topics

BMs are a useful tool to align business organisations, business strategies, and innovative IT systems. They are units of analysis and represent the business rationale, where strategic actions can be based. A business model is a conceptual tool that contains a set of elements and their relationships and allows the expression of the business logic of a firm. It describes the value a company offers to one or several segments of customers and the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital to generate profitable and sustainable revenue streams (Osterwalder et al., 2005).
This research uses key topics from the Business Model Canvas to thoroughly analyse the different processes and relations within the organisation where data-driven tools can be implemented or fill a need. The four key topics *infrastructure, customer interface, value proposition* and *financial aspects* are defined as follows.

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Topic 1: Infrastructure

It is about how the company efficiently performs infrastructure and logistical issues with whom and with what kind of network. It comprises the partnerships, capabilities and key activities necessary to create a value proposition (e.g., product or service).

Perceptions	• What key organisational partnerships, capabilities and activities can be improved or more efficient by implementing data-driven tools?
Practices	• What organisation's key activities can be improved with data-driven solutions?
Needs	• What type of information, agreements or resources are needed to perform key activities more efficiently?
Barriers	• What lack of capabilities, resources, or partnerships hinders the implementation of data-driven tools?
Enablers	• How can data sources or data-driven features improve any process, or has it been done in the past? • What type of observations, data sources or information is required to improve the organisation's infrastructure?

Topic 2: Customer Interface

This key topic is related to who's the organisation's target groups, how it delivers products and services, and how it builds a relationship with them.

Perceptions	• How can data-driven tools improve the distribution channels and relationships with customers?
Practices	• How can data-driven solutions impact the customer lifecycle? • How can relationship mechanisms between the company and the customer be enhanced?
Needs	• To achieve the company's aim, what mechanisms and links are needed between customers and the organisation?
Barriers	• What type of data-driven link or mechanism hinders customer relations?
Enablers	• What type of data from customers is relevant for the organisation?

Topic 3: Value proposition

This key topic addresses the company's product or service (added value) to the users. It focuses on the organisation's business and what is being delivered to the market.

Perceptions	• How can data-driven tools influence the organisation's offering?
Practices	• How can data-driven tools impact the offering's descriptions (e.g., effort reduction), value level (e.g., utility), price level (e.g., high-end) and life cycle (e.g., renewal)?

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Needs	• Which aspects of the organisation's offering can be improved using data-driven approaches?
Barriers	• How has the user experience hindered the improvement or creation of new offerings?
Enablers	• What type of data-driven solutions and data sources can enhance the organisation's value proposition?

Topic 4: Financial aspects

Refers to the organisation's revenue model, cost structure and business model sustainability.

Perceptions	• How can data-driven solutions impact the revenue model and cost structure? • How can data-driven solutions affect the organisation's financial sustainability?
Practices	• What technologies are important for the organisation's cost structure and revenue framework?
Needs	• How can data-driven technologies Improve the registry of transactions (expenses)? • How can data-driven technologies improve revenue streams (e.g., lending, selling and advertising)? • How do data-driven technologies impact pricing methods (e.g., pay per use)?
Barriers	• What factors hinder current and new pricing methods and revenue streams? • What factors hinder the current and more accurate registry of transactions?
Enablers	• What are data sources important for the revenue model and cost structure? • How can data-driven solutions increase the range of pricing methods? • What financial sources can enable the implementation of innovative data-driven solutions?

Critical success factors and key performance indicators

Critical Success Factors (CSF) are concepts related to the organisation's actions to achieve its goals and objectives and implement strategies. One or more key performance indicators (KPIs) can measure the degree to which the CSFs are earned. KPIs, then, are quantifiable metrics the organisation uses to evaluate progress towards the CSFs. Delving into these topics allows gaining insight into the information the MODERATE platform can strive to achieve as an output useful to industrial partners and potential users. Additionally, it will enable developers and other WPs to establish the outcomes of the MODERATE platform by demonstrating what indicators the platform can deliver and delivering insights on where these results can be implemented into the organisations' value chain.

Critical success factors (CFS) and key performance indicators (KPIs) can be found in the interview answers while discussing the organisation's value chain. Nevertheless, familiarity with the built environment processes is advised to identify what information can be translated into already studied KPIs in practice and real estate management literature.

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Analytics Categories and expectation clusters

In line with the Grant Agreement, MODERATE have categorised the different possible analytics into three main groups: (1) System management, (2) Building optimisation and assessment within energy communities and (3) Decision making. Please refer to the GA (page 6) to address the definition of these categories. In this study, qualitative data allow us to gain insight into the users' expectations concerning the three analytic categories suggested by the GA. Thus, three cluster concepts are aligned with the GA's three main groupings, as shown in the image below figure.

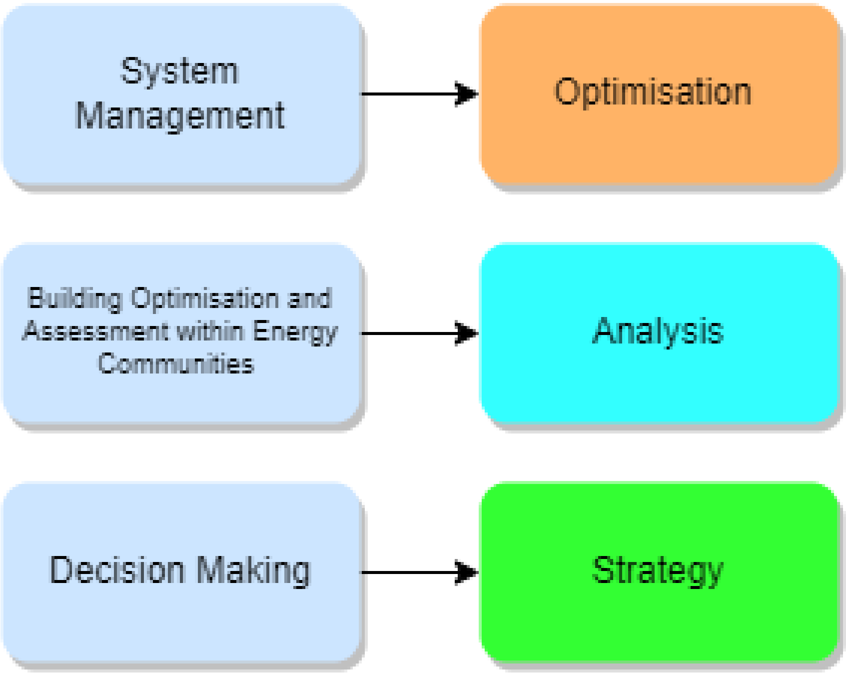

Figure 2: Exploration clusters aligned with GA analytics categories

In this exploration, the Optimisation cluster compiles the expectations or needs of the user related to managing considerable amounts of meaningful data from buildings systems to predict and diagnose a system's behaviour. Secondly, Analysis tools enable possible validation and benchmarking of two or more entities (e.g., methods, areas, persons, satisfaction, systems or objects) behaviours. Lastly, Strategy is related to the expectations for evaluating trends, e.g., financial risk, historical financial data, and environmental and social demands that allow the users' organisation to gain a general overview of the situation and assess impacts on implementing strategic measures.

5. Identified users – stakeholder groups

MODERATE project focused and design ethnography approach strives to involve a broad range of stakeholders. The table below provides a "catalogue" of key stakeholders who can be engaged in qualitative research, considering its context ecosystem.

Table 3: Target stakeholder catalogue

Category	Description
Energy managers	Collectives in charge of strategic evaluations of energy use in buildings. Organisations overseeing energy usage and planning for energy efficiency in buildings.
Utility companies	Collectives or organisations that provide amenities such as energy to buildings or any Real Estate.
Territory governance – policy makers	Entities who make strategic decisions in the infrastructure of regions/cities/villages and use the data for decision-making processes. Monitor and tune up environmental impacts using policies. These organisations can tune the demand and supply dynamics of resources such as building stock, rent and energy prices.
Real estate Investors (Building owners)	An individual or collective that allocates resources to purchase, maintain and sell Real Estate assets, entering a financial scheme operational through the building's financial lifecycle.
ESCO's	The Energy Service Companies (ESCOS) provide a broad range of energy solutions, including designing and implementing energy savings projects, retrofitting, energy conservation and energy infrastructure outsourcing, power generation, energy supply and risk management.

5.1 Recruiting stakeholders

The key stakeholders are broadly conceptualised. A crucial next step is the identification of personas (individuals) to conduct the design ethnography-inspired research – the individuals representing the key stakeholders. Some recommendations for their recruitment include:

- Fill in the persona template (Annex 4) with the identified participants before recruiting them. This allows for characterising the stakeholders and facilitating a context of the data collection process.
- Use long-term relationships - Start with long-term contacts (if any) with industry partners/external stakeholders. These contacts are the most trusted within the consortium and are willing to collaborate and assist in improving the data collection process.
- While approaching potential research participants, being prepared to send key information by mail is recommended. (Start the approaching process always with an e-mail and follow up with a phone call). The related WP leaders can gather key information.
- When the appointment is scheduled, it is important to check if the researcher can obtain information about the participant's knowledge, experiences, stories, and anecdotes related to the specific qualitative research topics.
- Use a "snowball sampling technique" – once the researchers have started the process, they can ask initial participants (in an interview or a co-creation workshop) to help identify and contact other individuals who might be willing to participate in the research.

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5.2 Increase the network of MODERATE

There is room for increasing the number of stakeholder groups.

This means that there may be other stakeholders that were/are of key importance to the specific MODERATE platform context, such as initiators, enablers, or barriers. These target groups may be a part of our “unknown unknowns”; in other words, they are contacts that researchers are not aware of yet or understand. Therefore, it is advised to understand and use recommended templates, do desk research in the niche market of the interlocutor, listen attentively to the interlocutors, and encourage them to explain the various relationships within the social network.

A focused and design ethnographic research approach strives for quantity and diversity of perspectives/personas, organisations, and positions (End-user to data producer).

Focused ethnographic-inspired research focuses on short periods in which a considerable amount of information is collected (Müller, 2021). This makes it important to collect and interpret various information during the interviews. Subsequently, this information can be filtered by framing the established range within the analysis process (in line with WP5).

Having as many (end-user) perspectives as possible from design principles is important. This creates a different perspective on issues, with a different approach (process) and solution direction (product). This can lead to the desired design thinking process and the MODERATE platform.

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6. Research methods guidelines

6.1 Overall guidelines

The following sections contain guidelines for using the research methods within MODERATE. These are **semi-structured interviews** and **co-creation workshops**. The key part of the research method is the interviewer's ability to research, analyse and interpret. For this, a mutual connection with the interlocutor is crucial. It can be achieved through an interested and empathetic attitude, wanting to be the listening ear of the interlocutor. Wanting to know the more profound question behind the question, an organisation's actions can be truly explained (Sinek, 2009).

Both research methods can, in principle, be applied to any of the MODERATE key stakeholder groups. Indeed, MODERATE's focused and design ethnographic-inspired research encompasses a spectrum of stakeholder groups beyond the static division between "users" and "experts."

The qualitative research will enable MODERATE to learn about the perspectives of the (potential) end-users and to contrast and, where possible, merge these different perspectives (personas) to formulate a diverse spectrum of end-user stories and stakeholder groups. From this point of view, MODERATE can assess where the enablers and barriers lie further and which problems, conflicts, or unequal distribution diversity provides. The research participants' specific personas, organisation strategy (inside MODERATE) and culture will impact the research methods, methodology and structure. That is why MODERATE has different flexible approaches to stakeholders. First, we have an open process with room for diverse perspectives and a wide variety of questions inside stakeholders' perception analysis, including perspectives of the industrial partners and the chosen target group of stakeholders by the industrial partners. These stakeholders are preferred because of their strategy and related activities, possibly increasing the MODERATE network with new partners and alliances. In the co-design phase to define the key features for the MODERATE Marketplace, the external stakeholders chosen before will get a more specific approach.

6.1.1 General assumptions

Depending on the pilot's context, the research methods could be more suitable and effective for one type of organisation, especially research participants (personas). Influencing the reliability and relevance of the gathered information. That is why the research plans will be designed and customised individually for each pilot, but in general:

Semi-structured interviews are particularly well suited for the demonstrators and the industrial partners, specifically those of their representatives. This method could also be suitable for assessing an unknown group of potential stakeholders/partners.

Co-creation workshops are particularly suitable for gathering perspectives and experiences for the demo cases of a diverse group of end-users. They include industrial partners and intended stakeholders. For this method, two aspects are difficult to address. The first is maintaining focus in the online co-creation workshops, where different organisations from different countries will be present. To this end, clear roles, tasks, and tools need to be established that serve during and in preparation for the workshop. This could prevent chaos and increase the efficiency of the process in the workshop. Ultimately, the facilitator will need to retain leadership and be allowed to give it away naturally where necessary (context-dependent). An eye for creativity and peer feedback on each other's input is critical.

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The second issue that can be an obstacle is bringing together a variety of representatives (personas) for each demonstration case at a particular time (due to work schedules and IT barriers). Therefore, a pre-planned event or something along these lines could offer a solution.

6.1.2 Challenges for qualitative research

Interviews and co-creation workshops provide general methodology tips and guidelines for engaging the industrial partners and external stakeholders. The policies likewise apply to the composition of the co-creation workshops and have less influence on the chosen interlocutors for the interviews. Before the methods are explained, here are some common and MODERATE specific challenges of qualitative research.

Technical knowledge - The essence of focused and design ethnographic research is to understand the participant and co-create with them. However, the platform's end users have different backgrounds, expertise, and knowledge, so certain end users should have a less technical approach, potentially enhancing the platform's usability, reach, features, and functionalities.

Open-ended questions - To find out the relevant information of the end user, they must feel free to tell their story. The researcher may be able to achieve this by asking open-ended questions (e.g., ask, “How does your company look at sustainability, which activities were easy or difficult to implement?” rather than “I understand that there were many difficulties with the setup of sustainable activities – what were they in your case?”).

Taking a critical stance - Complementing the above uncritically, accepting the views and opinions of the interlocutors can also be challenging. Researchers must remember that the interlocutor's need does not have to be the organisation's representation, supplemented that everything cannot be generalised. Even if the researcher is interviewing (for example) a national policymaker, their interpretation may differ from that of their colleagues from the same or a different department of the ministry. During the conversations and analysis, try to make a difference between their opinions, persuades, and values. For example, when interviewing a national policymaker, their interpretation may be different from that of their colleagues from the same or another department of the ministry. During the conversations and analysis, try to differentiate their opinions, persuades, values, concrete experiences, commonly shared (recurring) attitudes, values, and influences within the stakeholder group, and objective facts. When conducting research with representatives of organisations, also strive to gather the organisation's views rather than individual ones (nevertheless, collect their concrete opinion that shed light on the MODERATE platform, which can be told from their perspective).

Positioning industrial partners - Field research recognises that researchers have their values, persuasions, beliefs, and views on certain things. This may influence and impact the research design, the research process, and his findings. The position of the industrial partner concerning the target group stakeholders should not lead to incomplete, unreliable, uncredible information arising from power imbalances, personal stake, willingness to participate, reciprocity or other factors. When consortium partners identify these risks early on, measures can be implemented to make the interviews and co-creation workshops more efficient.

Ethics in qualitative research - qualitative research deals with people and various kinds of potentially sensitive personal data. The key purpose of research ethics is not to harm the involved research participants; therefore, compliance with legal and ethical requirements is always necessary during qualitative research. Due to this, the researcher must consult the D1.5 Data Management Plan, where the needs of ethics and personal data protection in ethnography-inspired research have been

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explained in detail. Therefore, the guideline advises that the researcher translate the Informed consent form and the information sheet into the stakeholder's language.

6.2 Semi-structured interviews with identified user groups

Focused ethnography-inspired research will be carried out with semi-structured interviews. The main aim of design ethnography is to get a good relationship with the stakeholders and collect an enormous variety of data; the interviewer wants to get the values, persuasions, opinions, live standards, and other kinds of information in one specific interview from his interlocutor as input for the innovation process. Therefore, semi-structured interviews have a good manner to improve that, including specific topics and questions from the research; however, these are used to guide the conversation in an open-ended fashion and are not followed strictly. The questions can be considered a checklist of topics that may be covered in the discussion, while the key is to remain flexible and responsive to the ideas and issues brought up by the interviewees. Nevertheless, the interviewer can use their instinct, observational ability, and knowledge to change the attention to a specific topic or question.

Paragraph 6.2 zooms in first on the semi-structured interviews with representatives of industrial partners, followed by the representatives of the external stakeholders. Finally, it concludes with general tips and tools for conducting semi-structured interviews.

6.2.1 The industrial partners

Involved consortium partners – IVE, ENERCOOP, WUERTH, VEOLIA, KOHLER, and SYNAVISION.

Focus of interviews – Interviews are from an organizational perspective and based on facts and opinions, including the personal view, values, persuades, and experiences of the interviewee and the strategy and activities of the organization; therefore, the interviewer must distinguish facts and personal opinions. The aim is to get a view of the perspective of the industrial partner and their long-term vision of the MODERATE project, the first round of interviews focus on the knowledge and experience of the interviewee on sustainability, technical, effectiveness and co-creating capability, including the experience, knowledge, and implementation of these values. The second interview has as its purpose to identify the need for analytics and the kind of data that is needed when using the analytics.

Long-term relationships - The representatives of industrial partners often have related goals, values, and beliefs combined with the same expertise. They are likely to have specific knowledge and interest in common research topics. Therefore, they are more motivated to discuss these topics and build long-term relationships. For this, the interviewer should give a preview of the topics and questions and provide some theoretical background about these topics, including more detail during the interviews.

Symmetry could be misleading - Even though the communication process may be more symmetric for the interviewer (in terms of terminology, depth of understanding, knowledge on the topic, etc.), remember to check as the interviewer the meaning of specific concepts used, as the exact definitions may differ between different fields of expertise.

Adapt the research questions - Representatives of industrial partners have divergent functions, expertise, values and persuades – The interviewer must check the interview template (Annex 1) and adapt the questions to the specific personal background and beliefs of the person and their field in the organization. Therefore, prepare several more specific (technical, sustainable, social-relational etc.) sub-questions.

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6.2.2 External stakeholders

Involved stakeholders – Organisations or persons who play a role in the value chain or network of any of the industrial partners who have a direct or indirect impact on the input (setup), process (co-creation), and output (the apps and services and infrastructure) of the MODERATE platform in the future. Before conducting the interviews, the interviewer must know the facts about the organisation and the interlocutor, which gives a better base for distinguishing facts from opinions.

Build on knowledge and expertise – The wider range of knowledge and expertise could lead to more integral relationships inside and outside MODERATE because the budget for MODERATE is limited. In addition, it could also bring more end users' perspectives. This possibly improves the effectiveness of the process, comprehensiveness, reliability, and creditability of the output.

Identify their expertise and background – The external stakeholders are usually unknown to the consortium. Therefore, it is essential to identify their knowledge and experience before involving them in the co-creation process. If they have specific expertise, vision, power, etc., they can leverage these factors in certain parts of the co-creation process. This empowers the intended stakeholders and reinforces the effectiveness of their role in the process.

Customize the research topics and questions – External stakeholders have various differences in expertise and a wide range of backgrounds, values, persuades, and positions – Check the interview template (Annex 1) and customize the topics and questions to the knowledge and expertise of the interlocutor. Therefore, prepare several more specific (technical, sustainable, social-relational, etc.) sub-questions.

Do not underestimate their knowledge – Even though external stakeholders by profession are not experts in sustainability, ICT, or data performance; some external stakeholders have acquired significant technical, organizational, or procedural knowledge and background through their commitment and investment in these topics, related to their values and beliefs. Therefore, it is essential to value and records their information.

Guard diversity – Identify not only stakeholders from one target group because the aim is to get a perspective of end-user needs. Therefore, categorize stakeholders in terms of their roles, gender, age, knowledgeability, and position.

6.2.3 General tips and tools for semi-structured interviews

Preparing interviews

Activity	Description
Time-management	The interview process (from recruiting participants to reporting) can take 6-8 hours. The interviewer must be sure of planning sufficient time, effort, shared responsibilities, and actions among the team members.
Contact and recruit external stakeholders	The interviewer should list stakeholders from the stakeholder analysis who could participate. As the interviewer, contact the stakeholders within the organization's network first. Following up, asking for their participation and their recommendation or assistance in recruiting other external stakeholders who can answer the specific questions that are not resolved. Let them know how long the interview will take (about 90 minutes) and monitor this time frame. Also, consider the background of the intended stakeholder, and understand their position and importance to the research.

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Prepare materials	Check the interview sample templates (Annex 1) and the user persona format (Annex 2) and customise them related to the position, expertise, and knowledge of the target groups. Know you cannot answer all the questions, so you must prioritise the questions which lead to a comprehensive view of the user needs. In addition, hold the template as a backup or reference. Also, send out the agreement form and other materials and visuals like the interview template, for instance, a summary of the research project (one page) and some visuals of the available demo cases.
Select location	Please be aware that the consortium partners are in different European countries with a long distance from each other. Therefore, Teams is proposed as an online location space for the interviews with the industrial partners. From Teams, the interviewer can choose for a formal or informal setting, depending on the context and the interlocutor(s), since a comfortable environment positively affects the interview process. Unlike the industrial partner approach, the external stakeholders around the industrial partner network may have a more physical approach. Because, in most cases, the distance between the industrial partner and its network is much smaller. They can think of inspiring meetings in project buildings (e.g., demonstration of already realized sustainable projects related to MODERATE) or opt for a more practical approach (e.g., showing the working processes or the sustainable aspects of the office).
Objective	The interviewer must set the interview objectives related to the stage of the research that he or she is in.

Managing interviews

Activity	Description
Introducing	Create a positive atmosphere by beginning with a round of introductions; who is the interlocutor, and who is the interviewer? In addition, it is important to indicate the purpose of the interview concerning MODERATE and identify the benefits for the interlocutor. In addition, as an interviewer, it is wise to set a learning attitude; for example, indicate that you want to learn from the conversation and their experiences to ultimately place their perspective (personal as well as organizational). The interviewer does a thank you before the interview starts.
Explain the aim of the activity related to the recording	Make clear why it is important to record the conversation; to better highlight and analyse the opinions of the interlocutors with their approval, while all recordings are handled according to the GDPR and personal data protection protocols. The goal is to understand and not harm the interlocutor. In addition, explain that the interviewer is not quoted verbatim.
Build a relationship	The interviewer can find common ground with the interlocutor – perhaps by asking a personal question to get them talking or by sharing a relatable personal story (e.g., holiday destination, similarities in organization background etc.) Therefore, the interviewer can proactively listen, take notes at the beginning of the interview, and outline the persona to make the conversation more personal.

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Send information background	Share the prescribed information, such as the questionnaire and background information on MODERATE and other related theories, by mail or Teams. This will ensure that the interviewer and the interlocutor(s) both have the availability of the needed documents during the interview.
Co-workers instead of Informed	The focused ethnographic research method is about long-term relationships based on co-creation. Keep this in mind during the interview and explain this to the interlocutor at the beginning of the interview. This can positively influence cooperation.
Start with simple questions	Start with a few broad questions about the organization and the process, which require the interlocutor to describe the process and give some company-width information. Follow up with more specific questions, structured in Annex 1.
Empathic attitude	The conversation will be more useful to the interviewer if they have a respectful, open, interested, and friendly attitude. If the interlocutor speaks freely about the prioritized and related topics, the gathered information will be more comprehensive and reliable.
Understanding the interlocutor	If the interviewee does not understand the questions, the interviewer should ask to repeat the point the interlocutor does not understand. Nevertheless, the interviewer does not need to get an answer to every question formulated; therefore, the interlocutor's specific questions should be prioritised. Also, feel free to admit new topics during the conversation, primarily if they are related to the interlocutor.
Open-ended questions	Ask open-ended and sensible questions and avoid quoting other interviewees or making too personal questions. In addition, do not ask suggestive questions (e.g., Don't you also think that) and confrontational or leading questions (e.g., I believe this is morally wrong. What do you think?)
Proof of the "Why	Ask the interlocutor politely to show them real/practical examples of their "Why" strategy. In other words, show the "How." This could be done by walking around their office or work environment, or the interlocutor can display photos or other materials from already started projects.
Beware of evasion and vagueness or socially desirable answers	The interviewer must not give the interlocutor a chance to be vague or evasive. Please do not move on to the next question; repeat your inquiry for as long as it is sufficiently relevant. The interviewee tells the interviewer he wants to hear. Overcoming 'socially desirable' answers necessitates that you are knowledgeable about the person and the topics, for example, 'if I understand you correctly....'

Recording date

Activity	Description
Note-taking	Take notes during the conversation. Do this from a proactive listening position and pay attention to the interlocutor's body language, such as eye contact, facial expression, and body movement. This can potentially show the priority of the topics. Moreover, notes inspire the formulation of follow-up questions. In addition, remain empathetic as an interviewer (e.g. (eye) contact) with the interlocutor by choosing moments to take notes.
Photos and videos	Please take photos or videos during the conversation, whenever it is allowed and possible, from the interlocutor's perspectives because visual material supports the analysed information.

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Audio	The recording supports the interviewer in the analysis phase. Make sure any voice recording gadget is valid and working. Furthermore, confirm to the interviewer that the recording is only intended to determine the end user's needs. Therefore, it will not be shared or published and stored securely within the MODERATE environment.

Reporting

Activity	Description
Prepare the analyses of the interview	Use the interview template (annexe 1) to note the most important observations, stories, findings insights, facts, and anecdotes from each interview. In the sequel, the notes can be translated into the template of the user persona (Annex 2). Therefore, see chapter 7 on Analysis and reporting for further instructions. It is important to take, process, and share (Teams) the notes as soon as possible. Since memories can fade quickly, making the information less complete and accurate.
Verify the notes	The reliability and completeness of the notes can be ensured by sending them back to the interlocutor (e-mail or Teams) at an early stage. The discussion partner can make additions or review certain notes critically. After all, the interlocutor knows best what they have said. Nevertheless, it is important to look critically at the interlocutor's comments and additions. The interlocutor may change or delete appropriate information because of their position and status. Moreover, it may even lead to a follow-up conversation with the interlocutor on certain topics.
Paper notes	All paper notes taken during the interview should be converted to notes in an online format and published on Teams after the meeting. This will ensure the information's completeness and accuracy and allow all consortium partners to evaluate the notes and use them for their workflow.

6.3 Co-creation workshops (demo cases)

The basis of ethnographic design research is <u>co-creation</u>, where the end user is the focal point. Therefore, the co-creation workshop approach provides an opportunity to learn from the multiple perspectives of the end user by <u>working together</u> and <u>learning from each other</u>. This approach is less detailed at the individual level than the interview approach. Still, it provides input for creating a product or service widely accepted in one or more specific niche markets. This ensures that co-creation workshops are an important prerequisite in product development to <u>break the gap</u> between <u>the early adopters</u>, who are more involved in the co-creation workshops, and the <u>early majority</u> (the largest group of potential end users) who desire a good product and service combination.

The analyses of the interviews can provide insights for forming the context for co-creation workshops. Still, the co-creation workshops, on the other hand, can provide information that opens up new possibilities for conducting in-depth interviews.

The preparation and design of the co-creation workshop

Objective	The co-creation workshops' objective is to co-create technology-based scenarios that address the various identified user needs. The first co-design workshop in each demo case will focus on the conclusions about the features

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	and related functionalities compared to the specified user perspectives from T6.1. The second co-design workshop aims to present, validate and further define the platform's mock-up. The results of the workshops should help arrive at an implementation process that matches user needs concerning the process, communication, and physical and technical solutions.
Determine the participants	Each demonstration case requires various participants since a stakeholder group looks from a particular perspective. While an effective co-creation process involves a variety of perspectives. Therefore, the industrial partner should feel free to involve different stakeholders from their network in the co-creation process. In which a variation of stakeholders' role and personality, age, gender, are decisive in bringing them together. Because only unequal roles can lead to unfair power relations. As a result, some stakeholders do not dare to act openly and honestly. In addition, if personality, age, and gender are added, a group will be assembled that is naturally balanced. This leads to a situation where roles will prevail to a lesser extent.
Define the aim and key questions	The pilots and the related processes have various stages of development. That is why the interview input leads to defining the aim and key questions for each demo case. Use the template of the co-creation workshop and adjust the topics and questions for the specific mixed stakeholder group. Therefore, the interview questions from the interview template (Annex 1) could be a good starting point
Determine the Number of participants	The co-creation workshops must have a minimum of four stakeholders to get a good interaction with each other and deliver co-create results for the project. In addition, it is also recommended to invite a maximum of eight stakeholders to the co-creation workshop. Otherwise, it is too difficult to facilitate the workshop and to ensure the input from each participant.
Recruit participants	Recruitment should start after the industrial partners have finished the interviews and have the analysed results delivered by HUYGEN. This gives industrial partners relevant insights into the MODERATE-related collaboration opportunities within their network. This gives the industrial partners the opportunity to better identify the potential external stakeholders who can contribute to the co-creation process in the future. Consider providing a small reward to participants after the event, if appreciated, and be mindful of pre-existing relationships among potential participants.
Select the location	Choose a flexible setting, depending on the participants and their personality, role, and the research questions drawn up. In addition, keep in mind that the location should be easily accessible, contain enough space and have appropriate resources. In addition, the setting should provide a positive and purposeful work environment. Consider seating arrangements, check your equipment and materials, and, if possible, offer drinks and snacks to create a more relaxed atmosphere.
Preparation materials	Consider recording equipment, printed consent forms, name tags, any other materials that might be needed (whiteboard, pens, and papers), and any visual material which stimulate and guide the discussion (e.g., visualization of the features, apps, and services.)

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The co-creation process – the data collection inside the co-creation workshop

Introduction and common attitude	Start with an introduction of the overall aim of MODERATE and of the specific co-creation workshop. Relate this with the common goals and attitudes of the participants. Therefore, the participants must introduce themselves to get the connection between each other (e.g., How do you describe sustainability from your organizations perspective?) The next step is to hand out the templates for the workshop and ask. Ask at the beginning of the co-creation workshop if it is possible to record the co-creation workshop – assure the participants their anonymity and strict protection of confidential data.
Managing the co-creation workshop	Preventing chaos in the co-creation workshop can be done by allocating two temporary roles. The chair- The chairmanager manages the co-creation workshop, by making sure that no one interrupts someone else, and that no comments are given on the proposed ides before everybody has been given the same opportunity to share their ideas with the group. This person is the facilitator and must lead the co-creation workshop into the solving direction of the main subject. The second role is the rapporteur – who not participate in the brainstorming either but has the sole task to register the outcome.
Structure of the co-creation workshop	The co-creation workshop begins with a round of introductions by formulating the common goal and the sets of the agenda (10 minutes). Following this, the first impression of the applications and services inside the related demo cases are presented (10 minutes). Next, participants are given 15 minutes to compare their user persona with the presented applications and services. Are they fulfilling their needs? After the diagnosis, the dialogue takes place between the different participants. They discuss their findings and formulate "needs" (30 minutes), whereby the chairperson asks critical questions to the participants. Then, through co-creation, the merged "needs" that best describe the market for the relevant MODERATE applications and services are determined (15 minutes). Finally, agreements are made, roles are divided, and goals are set for the next meeting, there will be a little space for giving some personal feedback to the chairperson and the rapporteur. This serves as input for the formulating of their individual development points (10 minutes).
Facilitating	The chair should manage time during the meeting and ensure that everyone feels comfortable, has input into the dialogue and agrees on the outcome, the user needs formulated. In doing so, do not constantly monitor the leadership of the meeting because it is semi-structured, but the higher purpose. The quality of the co-creation workshop relies on the skills of the chairperson to lead the meeting: "The ability to build unity by creating a warm, trusting, supportive and comfortable environment for open and honest dialogue between different groups and individuals." To which empathetic listening is a key requirement (e.g., help the respondent engage by summarising their answers, use gestures to encourage conversation). In addition, pay attention to participants by paying attention to their body language and recognise group dynamics.
Potential-follow up	Co-creation workshops can be a good opportunity to schedule in-depth interviews. Underline that the experiences the participants shared or points

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	they made were extremely interesting and ask whether anyone would be willing to discuss some of the topics individually in more detail.
Closing part	Thank the participants for their time, hand them the "rewards"/gifts, if appropriate. Also make sure you have collected signed consent forms!

Data Analyses and Reporting – Structuring data and feedback

Notes and audio	Use the notes and audio recording (if available) to collect participants' insights, observations, anecdotes, and stories during the co-creation workshop. Translate these notes into the user persona template (Annex 2) and process and share (Teams) the notes as soon as possible. As memories can fade quickly, making the information less complete and accurate.
Paper notes	All taken paper notes during the co-creation workshop should be converted in an online format and published on Teams as soon as possible. The rapporteur should do this right after the meeting. This ensures the completeness and accuracy of the information and allows all involved consortium partners to evaluate the notes and use them for their workflow.

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7. Guidelines for reporting and analysis

The image below (Figure 3) depicts a three-layered analysis approach. It comprises a group of interviewees named Users, two interview rounds and two rounds of analysis. The process aims to explore three aspects: (1) the stakeholders' values alignment with the MODERATE project's main topics, (2) the impact and relevance of the different analytics offered by MODERATE in the Grant Agreement within the Users' organisation, and (3) the measurable dimensions and data types relevant to the Users and other WP members involved in the development of the platform.

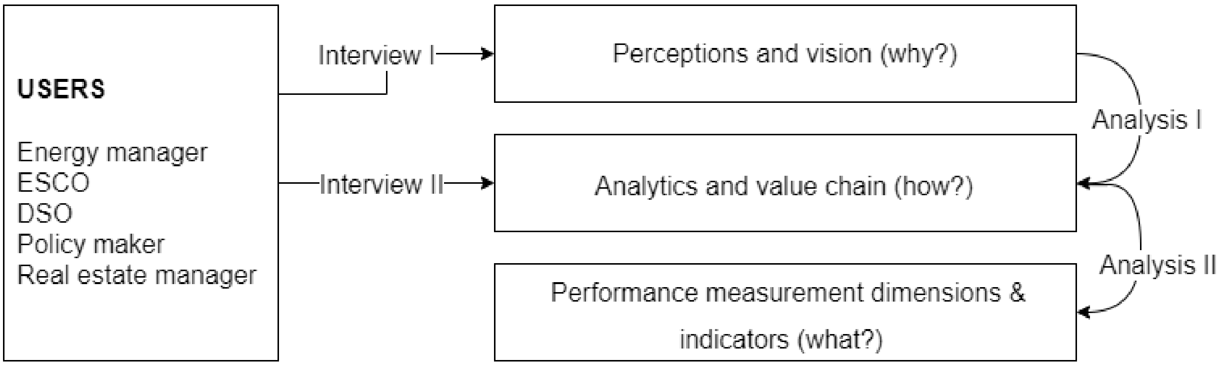

Figure 3: Three-layered approach

The reporting and analysis process is categorised into three steps:

1. Data Collection: Interview I using the template in Annexe 1.
2. Analysis and data collection: Analysis I and Interview II using Annexe 2.
3. Analysis: Analysis II and measurable dimensions interpretation.

7.1 Guidelines on reporting

Partners who carry out research activities in the co-designing phase of the MODERATE marketplace will be responsible for writing and submitting reports to task leaders (HUYGEN and TUWIEN) and sharing the notes inside the Teams environment using the template (Annexe 3). The content of these templates will be stored internally (verified by the interlocutor) and used as a base for analyses in steps 2 and 3. The interviews and co-creation workshops are reported individually.

This phase aims for the researchers to have a first approximation of raw qualitative data and examine it thoroughly in preparation for analysis. The amount of time dedicated to data collection may vary depending on the quality and extension of the discussion. Below are some recommendations for reporting information (table 8).

Table 4: Reporting data collection

Prepare data sources	• Examine personal notes (fill gaps) • Insert raw transcripts into interview templates (Annexes 1 and 2) • Integrate other visual materials, if there are
Report	• Use the template in Annex 3 to integrate and organise data in a table. • Include verbatim or capture ideas in words if the former is impossible. • Add insights and personal notes if relevant

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Fill gaps	• Mark the topics that can be discussed in the next interview round; it will reduce assumptions and is one of the aims of establishing a second round of interviews in this exploratory process design
Submit	• Upload this data to the designed platform of the MODERATE project and repeat the process for other exploratory activities.

7.2. Analysis and Results Guideline

The analysis of the data collected from the interviewees will provide relevant insights to identify the key features that MODERATE users can implement from the platform. As mentioned in this chapter, the analysis comprises two moments (in steps 1 and 2). The two analyses are done using the different merged tables described below.

7.2.1. Analysis I

As mentioned in this chapter, this first analysis explores the organisation's values and alignment with the MODERATE topics at a high level. The merged table with *sustainability, platform structure, Cost-effectiveness and Co-creation* concerning the six capital values from the IIRC described in Chapter 3 is used to aggregate the data gathered through the first interview.

Table 5: Analysis I scheme

	Sustainability	**Platform structure**	**Cost-effectiveness**	**Co-creation**
Natural				
Material				
Social-relational				
Human				
Intellectual				
Financial				

Each topic's insights are organisation-specific and contribute to understanding the organisation values within the MODERATE project. The results from this analysis give insight into arranging the second interview session, providing an organisation characterisation.

7.2.2. Analysis II

This analysis aims to understand, at a lower level, the impact and relevance of the MODERATE project's key features on the organisations and reveal any measurable dimension that can give insight into the parts developed within MODERATE. The merged table 5, containing the principal places in the value chain *infrastructure, customer interface, value proposition and financial aspects* related to the analytics in MODERATE *optimisation, analysis and strategy,* is used to aggregate the data of the first interview (if considered relevant) and second interview.

Table 6: Analysis II scheme

	Infrastructure	**Customer interface**	**Value proposition**	**Financial aspects**
Optimisation				
Analysis				
Strategy				

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Additionally, this process allows the co-designing phase of the Marketplace holders to comb through the qualitative data and identify measurable dimensions in the collected data. This data can be aggregated in a table with *critical success factors* related to the *key performance indicators* per organisation.

Table 7: Analysis II additional scheme

Organisation	Critical success factor	Key performance Indicator

The insights of each topic are organisation-specific and relevant for contributing to other outputs in this work package and additionally, support the outputs and processes at a project level:

Task 2.1 (*Platform Architecture),* where the outcomes of WP6 in general and the identified indicators from T.6.1./T.6.2 will be considered for the definition of the high-level architectural components, interactions and technology stack.

Task 4.1 (*Methodology set-up*) Insights on the described analyses will contribute to the output of the methodological machine learning framework using the identified indicators and analytics as the base for suitable methods explorations

Task 5.1 (*Analytics for buildings*), As mentioned in the Grant Agreement, the indicators are the "Rosetta Stone" to understand data and convert them into knowledge and then wisdom. Insights on the mentioned topics in these guidelines provide a basic understanding of the indicators and analytics expected by the platform users and how they can be implemented within their organisations.

In **Task .7.1.** The user categorisation and expectations within their organisation are collected using the developed methodology and approach in these guidelines. Additionally, the insights gathered by T.6.2. can be used as a base for the stakeholder analysis, the users' needs and further PoR (Programme of Requirements). It can also contribute to the output of potential users in T. 7.2. and its Deliverable D.7.2. *MODERATE Lean Model Canvas*.

In general, insights on the mentioned topics in these guidelines are relevant to the outputs and processes in **WP7** concerning PoR and exploitation strategies.

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Annexe 1: Interview template round 1 – user groups

Use this structure as a tool and reference for your conversations with MODERATE-related interest groups that are part of the MODERATE consortium or (in)directly involved in creating and developing the MODERATE platform. The guidelines provide the key questions, a set of (optional) sub-questions, and how the interview might proceed. Since stakeholder organizations are a diverse group (Energy/Facility Managers, Utility Companies, Real Estate, ESCO, Policy Makers), the discussing issues will considerably differ – therefore, adapt the sub-questions to the specific context of the interviewee as needed or add unplanned topics and (related) sub-questions, in advance a during the discussion.

Prescribed theory*:* The interviewer and interviewee should first go through the following summaries:

- IIRC (Integrating reporting standard)

The purpose: The template is to identify and map the first impression of the end-user needs. From which the raw features and functions are formulated.

The template also supports the identification of the (potential) target group stakeholders. The interview design allows the interviewee to think about the stakeholders (inside their network) they can involve in the MODERATE project.

Interview setup: The interview format is semi-structured, which means that the topics are leading during the interview, but the questions are not. The goal is to have an enjoyable conversation where the topics (blue questions) should be covered as completely as possible.

<u>It is not intended to go through all the questions under the subtopics (in bold). This normally leads to an inefficient conversation in which the correct and complete information is not gathered.</u>

Topic 1: Stakeholders' role (s) and experiences in sustainable solutions?

- **What activities does your organization carry out to positively impact sustainability? And what role can your organization play in ensuring sustainability within the MODERATE open online platform?**
    - o How do you describe *sustainability,* and how does your organization describe it? Which values are related to this (like the six-capital model)?
    - o What is the purpose of your organization concerning the world, and what is the reason for your organization to have a positive impact?
    - o Is company-wide sustainability supported within your organization? Why and how is this integrated or maybe not integrated?
    - o With which knowledge and experience of the sustainable built environment can your organization support MODERATE?
    - o Which stakeholders are necessary for your organization to have a real contribution in the field of sustainable solutions? And which stakeholders can prevent this?
- **From your organization’s perspective, what constitutes a building data marketplace to strive for sustainability?**
    - o What are the enablers? How and why?
    - o What factors hold back sustainability? How and why?
        - Internal
        - External
    - o Which stakeholders must be part of the data platform to promote sustainability and why?

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Topic 2: The structure/architecture of the platform?

- **What are the platform's desired elements, and how should they be integrated? (Technical side)**
  - What are the desired elements of the platform, and in which elements could you contribute to the platform's development?
  - How does your organization adopt new techniques and innovations and apply them within business operations?
  - What technical elements can your organization copy or take from other successful (building) data projects which have been efficient?
  - What could be the enablers and barriers, in your opinion, in the development phase of the platform (Look at the specific integration of appliances, apps, the infrastructure of the platform and the related services)?
    - What are the key success factors?
  - Does your organization foresee limitations related to the six capitals to unlock the full potential of MODERATE? If so, what steps and related activities should be taken?
- **What are the elements of a credible and reliable platform (social side)?**
  - How can the MODERATE platform, from your organisation's point of view, cross 'the chasm' in the early start-up period relating to the theory of Geoffrey Moore? Which values have an impact on this, and which actions are required?
  - What kind of knowledge and experience does your organization want to exchange with other consortium/project partners?
  - What social elements can your organization copy or take from other successful projects which have a positive effect on credibility and reliability and have been efficient?

Topic 3: The multiple values and cost-effectiveness of the platform

- **Cost-effectiveness (financial value) or multiple value effectiveness?**
  - How does your organization interpret cost-effectiveness? And why this interpretation?
  - Which values present your organization, and in which activities are they integrated (primary process or secondary)?

- **What are the critical elements for the MODERATE platform to ensure cost-effectiveness?**
  - Which knowledge, expertise, network, and technical and social solutions must be satisfied to ensure cost-effectiveness on a broader view? And what can your organization do concerning the six-capital model of the IIRC and the overall aim of the (MODERATE) platform?
  - How can multiple value thinking/creation in your organization's point of view in the long term support the cost-effectiveness of the MODERATE platform?
  - Which ideas does your organization have in measuring multiple values creation effectiveness?
    - Which features and functionalities do you need? And how?

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Topic 4: Co-creation/cooperation in the project

- **What kind of stakeholders can co-create with your organization during the development of the MODERATE platform?**
    - What needs (knowledge, communication etc.) does your organization have to get an effective role in the co-creation process?
        - How can the consortium guard the relationships (protocols, rules etc...) between the consortium partners and related stakeholders, and what must your organisation do?
        - How transparent and helpful must de parties be in the MODERATE project? Could you give examples?
    - Which kind of enablers and barriers related to the co-creation process does your organization see for the follow-up of the MODERATE project?
    - What are the critical values for successful cooperation/co-creation?
- **How can MODERATE have an effective co-creation process?**
    - Which role inspires your organization in the co-creation/design thinking process related to the demo cases?
        - Why this role and how is this role implemented with his (possible) activities in the MODERATE project?
        - What could be your added value? Why and how?

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Annexe 2: Interview template round 2 (company X):

Rapport:

Thank you for your participation in this interview.
We want to delve into the connection between MODERATE's features and the value chain of company X. Company X is an organization that… (here, the interviewer briefly describes the organisation's mission).
Let's talk about energy in your business. How does energy play a role in your organisation's value creation?

Questions on the value chain

Infrastructure

Do you see any process or problem that could be improved?
How have you been dealing with that process?
Have you thought about extra activities that may be useful?
What information or resource is useful for you?

Value proposition

What is your main offering?
Have you thought about implementing additional features into your value proposition?
Can data-driven solutions add value to your VP?

Customer interface

Who is your customer, and how does your VP help them?
What mechanisms do you use to get in contact with your customer?
How can data-driven solutions leverage these mechanisms?
How important is it to improve customer relations?

Financial aspects

How does your company make a profit?
Can you please describe your pricing methods?
Do you think data-driven tools may improve or reduce financial risks? How?

Fill gaps - Absent features and BMC areas (in the previous data collection)

These questions' formulation depends on thoroughly exploring the collected data in the first round. These questions are used to fill the gaps in previous data collection:

- e.g., Looking deeper into your value chain activities, do you think any tool for x can be useful?
- e.g., Is it useful to gain detailed information about the customers of your advice?

Validation - What we have seen (in the previous analysis) and prioritisation

These questions' formulation depends on thoroughly exploring the collected data in the first round. These questions are used to validate interpretations in previous data collection:

- e.g., Can analysis tools such as benchmarking leverage Company X's value proposition?
- e.g., Do you agree that enhancing analysis tools may help Company X?
- e.g., Also, decision-making tools such as data analytics for energy certificate harmonization can improve the value proposition.
- e.g. Do you agree?
- e.g. Do you think improving decision-making tools, such as analytics for De-Risking investments, will create funding opportunities for new processes?
- e.g. What would be the order if you had to order them in order of priority?

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Annexe 3: Data collection reporting template

Organisation	Question	Answer	Notes

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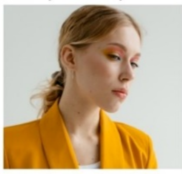
Annexe 4: User personas format

Add profile picture



ABOUT THE USER

PERSONAL CHARACTERISTICS

VALUES AND PERSUASIONS

Quote:

ROLE IN MODERATE

GOALS AND NEEDS

MOTIVATIONS

Age:
Location:
Occupation:
Level:

USER JOURNEY

CHALLENGES

PROBLEMS

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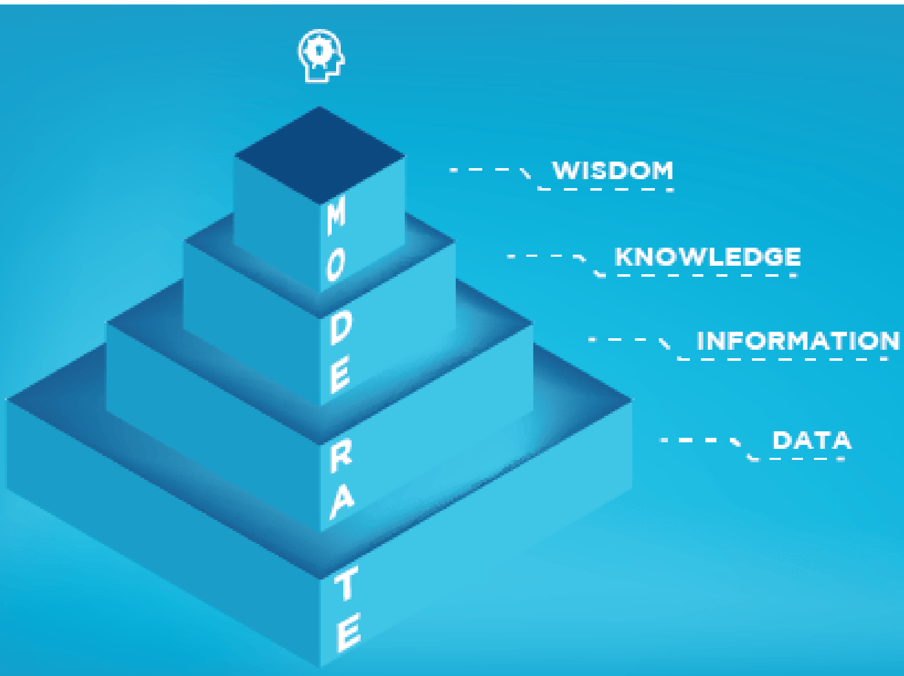

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