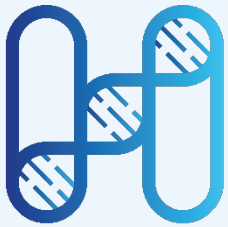

HEREDITARY

HetERogeneous sEmantic Data integratIon for the guT-bRain interplaY

Deliverable 6.1

GUIDELINES AND MANUAL FOR APPLYING THE HEALTH SOCIAL LABS METHODOLOGY

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EXECUTIVE SUMMARY

Health Social Laboratories represent an opportunity for project stakeholders to co-design and give feedback on Hereditary research processes and perspective research outputs design, such as the prototype of the interactive data analytics platform and the medical terminology popularization process. They would achieve the latter by helping analyse innovative ideas and perceptions regarding elements such as terminology, technology, and social and ethical issues.

The following manual begins with a brief overview of the concept of stakeholder engagement, its history, strengths and weaknesses, and then delves into the Exploratory Context Analysis conducted with project partners connected to Hereditary Use Cases and its results on the state of: relationships and stakeholders; therapeutic process and clinical activities; technology and research; communication, expertise and policymaking.

The following section, concretely containing HSL guidelines is divided into 7 chapters:

1. Objectives
2. Operations and organisational processes
3. Stakeholders
4. Activities
5. Staff
6. Recording and reporting
7. Evaluation

Each chapter contains specific methodological instructions and guidelines for the realization of the laboratories with necessary forms. Finally, the attached HSL manual Annex contains stand-alone editable versions of all forms, worksheets and presentations provided.

LIST OF ABBREVIATIONS

Table 1. List of abbreviations used in this Deliverable.

Abbreviation	Expanded form
HSL	Health Social Laboratory
HSLs	Health Social Laboratories
MS	Multiple Sclerosis
ALS	Amyotrophic Lateral Sclerosis
FTD	Fronto Temporal Dementia
PD	Parkinson Disease
PAR	Participatory Action Research
UNITO	University of Turin
UNIPD	University of Padua
RUMC	Radboud University Medical Centre
CRG	Centre for Genomic Regulation
UCD	University of Colorado Denver
EDPB	European Data Protection Board

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AUTHORS

Name	Organisation
Giuseppe Pellegrini	Observa
Chiara Lovati	Observa
Tobias Schreck (Reviewer)	TUGRAZ
Gianmaria Silvello (Contributor)	UNIPD
Anna Romanovych (Contributor)	UNIPD

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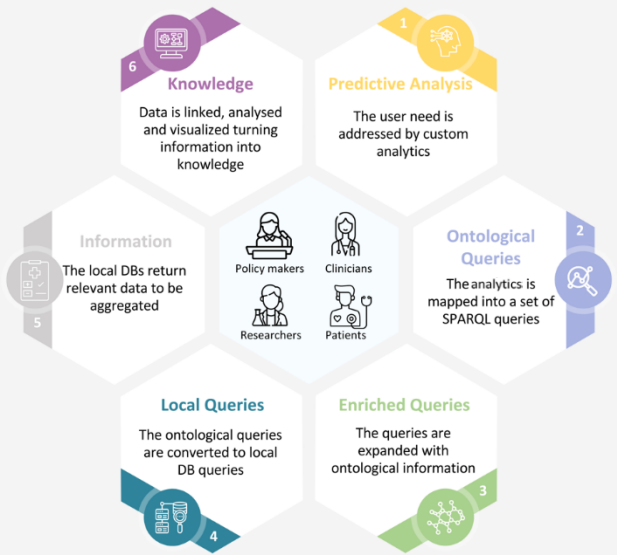
1 INTRODUCTION

The HEREDITARY project is aimed at transforming disease detection approaches, preparing treatment response, and exploring medical knowledge in neurodegenerative and gut microbiome disorders, through the integration of multimodal health data. It is also aimed at increasing public awareness and involving patient organizations and other stakeholders, following an effective path of citizen science.

Among project objectives, there is the development of an interactive data-driven solution capable of supporting prevention, decision-making, and citizen's trust, that will be aimed at researchers, healthcare professionals, and innovators. The platform, based on efficient federated learning and analytics approaches to query and aggregate data from multiple sources, and for multiple use cases, will provide access to an unprecedented level of connected data from various modalities, and will enable end-users to have a complete range of information about diseases, including potential relationships between them, risk factors, diagnostics, and improved therapeutic procedures.

The first step of this process will be supported by the development of a Multimodal Semantic Integration Platform – the backbone of the analytic infrastructure – where HEREDITARY will be able to address stakeholders needs while producing knowledge (Figure 1).

Figure 1 The six steps to address the "stakeholder needs" producing "knowledge".



It is in this framework that the establishment of a series of Health Social Laboratories (HSLs) with interested project stakeholders will take place. HSLs will be a stakeholder engagement event aimed at addressing needs and expectations of different actors, through a variety of modalities, where researchers, clinicians and patient associations, will be actively involved in addressing the complexity of information related to Hereditary research process and in offering points of view and suggestions for an effective construction of the platform, of its terminological content and more.

The following manual will first provide a brief history of stakeholder engagement, its strengths and its weaknesses. Subsequently, it will provide the guidelines to successfully conduct an HSL, covering: stakeholders, their identification and invitation; activities,

guidelines and agenda; facilitators and assistant, profile, responsibilities and obligations; reporting, technical aspects and commentary; evaluation, instructions and processes.

All sections will be complemented with ready to use forms, hands-on guides and checklists provided in the annexed "*HSL Manual ANNEX"* folder.

1.1 HISTORY OF STAKEHOLDER ENGAGEMENT

In the industrial age of medicine, healthcare used to be a commodity reactively made available to patients in a mass-produced manner. Today, in combination with the digital era, medicine must evolve to become predictive, personalized and participatory (Hesse et al., 2010) A "well-designed" medical device must not only be safe and effective, but it must also meet the needs of both the people who will administer it and be treated by it. This requires considering capabilities and working patterns of clinical users, needs and lifestyles of patient users, environments in which the device will be used, and the system(s) of which it be part of (Lehoux et al., 2013)

The above challenge calls for the accounting of stakeholders needs into research processes. This kind of practice, called stakeholder engagement, has grown into a widely used concept in business and society research (Kujala et al., 2022). Stakeholder engagement can improve the relevance of research, increase stakeholder trust, enhance mutual learning between stakeholders and researchers, and improve research adoption (Concannon et al., 2014). In addition to creating value and knowledge, the action of including the perspectives of all key stakeholders into the research process has powerful benefits, such as enhancing both the short-and long-term relevance of clinical research efforts (Boaz et al., 2018).

Stakeholders are defined as "individuals, organizations or communities that have a direct interest in the process and outcomes of a project, research or policy endeavour" (Deverka et al., 2012), and they can engage in a broad range of activities depending on their own skills and attributes, and on the capacity of the researchers conducting the studies (Boaz et al., 2018).

Stakeholder engagement as a construct started to gain prominence in literature at the beginning of the 2000s and multiple definition have been presented, but Kujala et al. (2022), offer an inclusive definition of stakeholder engagement: *"stakeholder engagement refers to the aims, activities, and impacts of stakeholder relations in a moral, strategic, and/or pragmatic manner".*

Levels of engagement range from consultation, to collaboration in partnerships with researchers, to stakeholder-directed projects. Participatory research approaches have been increasingly recognized as potentially beneficial in several countries, and a robust community-based participatory research literature documents key issues in including communities in research (Forsythe et al., 2016).

1.1.1 STRENGHTS AND WEAKNESSES

The rise of digital technologies fostered the adoption of the process of non-experts contributing to scientific knowledge in new areas of medicine (including genomics, epidemiology and public health), bringing an array of new perspectives and values to clinical healthcare research. This expansion has been framed as a support to the democratization of research, to better scientific literacy, and to new scientific breakthroughs (Strasser et al., 2019).

As in the case of Participatory Action Research (PAR), a collaborative and social process driven to: i) generating knowledge or understating on what will bring about change, and ii) improving quality of the actions, reactions and interventions through their monitoring, reviewing and adjusting (Kjellström & Mitchell, 2019), involving stakeholders at multiple levels of applications development allows for the identification of new needs, values and challenges, such as design shortcomings in efficacy, safety, or operation ease.

Research further shows that stakeholder engagement in the process of genomic information integration can address key challenges areas such as the management of the fast-growing knowledge base, the implications of complex genetic results, their relative priority to patients, and the administration of privacy, security, and confidentiality of personal genomic data (Hartzler et al., 2013). Areas of application could include genomics research samples storing and sharing or the implications of the usage of new genomics technologies in clinical practice (Lemke & Harris-Wai, 2015).

On the downside, complex genetic results such as the personalized risk profiles offered by genomic research companies carry the risk of overwhelming or even misleading individuals dealing with serious illnesses and difficult life decisions (Hesse et al., 2010). As such, it is important to define the systems access privileges and roles, and to focus on end-user involvement, communication and evaluation within workflow design and testing (Hartzler et al., 2013).

Practically speaking, in instances of stakeholder engagement such as HSLs, attention needs to be paid to commonly reported challenges to engagement such as the lack of stakeholder time, the lack of facilitating team time, difficulty in finding the right representatives to engage, or the lack of research team resources and training/ background. (Forsythe et al., 2016).

1.2 EXPLORATORY CONTEXT ANALYSIS

To gain familiarity with the HSL fieldwork, we designed and conducted a series of exploratory interviews with clinicians and researchers (*n=9*) from the Hereditary partners in charge of the project Use Cases, as shown in *Table 2*, aiming to gather insights within four main areas of interest:

- Relationships and stakeholders
- Therapeutic process and clinical activities
- Technology and research
- Communication, expertise and policymaking

Table 2. HEREDITARY use cases

	Concept	Disease(s)	Technical Outcomes	Partner
USE CASE 1	Neurodegenerative diseases phenotyping & prognosis evaluation	ALS	Clustering, stratification	**UNITO**, **UNIPD**
USE CASE 2	Next-generation diagnosis and treatment response for neurodegenerative disease	ALS, MS, FTD	Clustering, stratification, scalability	UNITO, UNIPD, **CRG**
USE CASE 3	Signs of Parkinson's disease in multimodal data	Parkinson	Biomarkers, prediction	**UCD**, UNIPD
USE CASE 4	Phenotyping of the gut-brain axis in healthy individuals	GUT-BRAIN AXIS	Analytics, learning, visualization	**RUMC**, UNIPD
USE CASE 5	Gut-Brain linkage and disease relevance	MULTIPLE DISEASES	Analytics, learning, visualization	RUMC, UNIPD, UNITO

The exploratory analysis is based on the following interview guide, shown in *Table 3*:

Table 3. Exploratory analysis interview guide.

RELATIONSHIPS AND STAKEHOLDERS
• How would you describe the clinician/researcher-patient relationship? • How would you describe the clinician/researcher-patient association relationship? • In what way patients learn about and connect with patient associations? • How would you describe the administration-clinician/researcher management relationship? • How would you describe the patient-patient association engagement?
THERAPEUTIC PROCESS AND PATIENTS
• What type of connection is there between exams output and disease diagnosis? • What type of information is used for treatment definition? • To what extent is disease treatment standardized? • Are patients' needs typically accounted for in treatment definition? If yes, how? • What are the main challenges in treatment definition?
TECHNOLOGY AND RESEARCH
• How is technology currently used in clinical processes? • Do you expect the relationship between technology and clinical processes to positively or negatively change in the next 5 years? • Do you believe technological advancements could further improve clinical processes? If so, how? • Do you believe technological advancements could further improve medical communication? If so, how?

RELATIONSHIPS AND STAKEHOLDERS KNOWLEDGE, EXPERTISE AND COMMUNICATION
• In your opinion, to what extent is medical communication understood by patients? • How would you rank patients understanding of scientific knowledge on a scale of 1 to 10? • Do you recognize any challenges within medical information communication with patients? • Do you recognize any challenges within medical information communication with patients in intercultural interactions? • What role do visual information have on medical communication with patients? • Is medical terminology, disease specific or not, typically explained within an average first visit with a patient? • How is communication with patient associations different than the one with the general public?

To summarize the aims of the interviews, the following research questions were identified:

i. How is the partner institution configured? Who are the main actors and stakeholder?
ii. What type of activities does the partner institution carry out? Do these include contact with patients?
iii. How does the partner institution approach science communication? Are clinicians and researchers offered training? Does the partner institution engage in citizen engagement activities?
iv. How is the *administration-clinician/researcher* management relationship configured? How are research priorities established, and who is in charge of securing funding?
v. What is the partner relationship with technology and/or AI? What is their opinion about it?
vi. Is the partner institution connected to any international collaborators? Does it have experience with policymaking?

The interview series involved 9 between clinicians and researchers from the 5 Hereditary clinical partners, including universities, hospitals and research centers located in Italy (2), Netherlands (1), Spain (1) and United States (1).

The analysis of the interviews highlighted some important elements. First and foremost, it allowed us to ascertain the high multidisciplinarity characterizing the use case partners' institutions, both in terms of expertise and research activities. The totality of profiles from the different teams included clinicians, professors and lab managers, but also computer scientists, bioinformaticians and software engineers.

All but one of the institution teams had regular contact with civil actors, including patients, caregivers, advocacy groups, and association, through direct or indirect clinical activity or other outreach efforts, i.e. citizen science actions. The same teams also partook in clinical, genetic, or pharmaceutical research activities. The one institution that doesn't have contact with civil actors instead, is specialized in controlled-access genome and phenome data.

The experience of the partners with diagnostics uncertainty and patients' need provided some insights into the different elements of clinical practice and research processes. On uncertainty, we gathered reflections on the relationship between symptoms and treatment success, versus treatment resistance, or on the importance of genetics, familiarity and clinical history. On patients' needs instead, partners mentioned the relevancy of transparency and psychophysical well-being, but also bodily autonomy and quality of life when dealing with serious illnesses.

On a community note, it was clear that many actors gravitated around the institutions whose representatives participated in the interviews. From regional, to national, and international collaborations, some connections that were particularly prominent were those with patients' associations, capable of sometimes covering fundraising, campaigning, and awareness raising, while also taking care of concrete patients' needs with services such as transportation. Also very prominent, was the relationship with international research groups; less so, the one with policymaking bodies and governmental organizations.

All of the institutions are engaged in science communication to a certain degree. The communication aims described by the interviewees could be divided into technical aims and societal aims. The first category included communication activities on science, research, technology, or diagnostics. The second category included communication activities on impact, sensibilization or dissemination.

Communication with patients and/or citizens is not always straightforward. Interviewees identified some elements of challenge spanning from demographics to knowledge accessibility issues; for example, the citizen population cultural diversity poses a need for intercultural adaptation in communication, while different skill levels in risk understanding and critical thinking call for the modulation of communication technicality, figurativeness, and complexity.

Finally, as technology permeates the activity of most partner institutions, the teams were able to provide useful insights into its relationship with clinical and research activity. Technology and data allow partners to conduct research in many different areas, but they also require specific expertise, data management skills, and knowledge of legal frameworks and data protection normative. Furthermore, when using data technology in the relationship between clinician or researchers and patient or citizen, some ethical concerns arise. These concerns relate to the culture of informed consent, the data sharing opt-in, opt-out, and withdrawal rights, data privacy issues, but also connect with the raising of awareness on the societal value of data, and the opportunities of open access data research.

All these elements shape the current landscape at the interaction of medicine and technology, and as such, they have all been taken into account in the design of these Health Social Laboratories.

2 HEALTH SOCIAL LABORATORIES MANUAL

Health Social Laboratories represent an opportunity for project stakeholders to co-design and give feedback on Hereditary research processes, and help define an array of elements for the projects' perspective research outputs design, such as the prototype of the interactive data analytics platform and the medical terminology popularization process. Elements to discuss will include technology, terminology, ethical and social issues, and other various topics.

The following manual provides in-depth instructions for the realization of a Health Social Laboratory while maintaining a flexible structure. In light of the variety of consortium partner organizations, both in terms of stakeholder network and disease-specific expertise, the methodology is designed to be highly adaptable to different contexts, and can be reviewed as needed. Furthermore, during all phases of HSLs (organization, realization, follow-up, etc.), Observa will be available for both organizational and methodological support to the project partners who may request it.

2.1 OBJECTIVES

The objectives of Health Social Laboratories are to allow stakeholders:

- To learn about the Hereditary project and its goals
- To construct feedback on the project, particularly on:
  - technology
  - terminology
  - social and ethical aspects
- To be engaged in meaningful discussion
- To collaborate on the gut-brain interplay

The activities are aimed at fostering meaningful discussions and collaboration among stakeholders on various project topics. They are designed to create a collaborative environment where participants can share their perspectives, provide feedback on Hereditary research processes, and contribute to the project's success. Through structured yet flexible formats, these workshops will help ensure that all voices are heard and that the collective insights of the stakeholders' groups help guide the project's direction.

2.2 OPERATIONS AND ORGANISATIONAL PROCESSES

Multiple HSL will be simultaneously activated with the collaboration of several Hereditary partner institutions. With each participating institution relying on their unique stakeholder network and disease-specific expertise, HSLs will ultimately collect a significantly varied array of perspectives and opinions. The laboratories will run according to a predetermined series of iterations, identifiable within the following three learning cycle phases:

- First phase: establishment of HSL and first implementation of the activities; in this phase the various institutions networks and specific set of skills and expertise will be identified and will converge into the planning of a first HSL event based on the methodology and guidelines provided in this manual.

- Second phase: collection of first results and adaptation of methodology; by Hereditary year 2 we will have results from around 5 first HSLs, and

the analysis of the latter will allow us to begin reporting on the outcomes and efficacy of the activities, but it will also allow us to evaluate the positive and negative aspects of the methodology implemented. Thus, this phase will include an adaptation of the methodology of the laboratories, also allowing for the alignment of HSL with the various other project progresses, such as on the terminology and visualisations research processes.

- Third phase: collection of results and elaboration of findings; the last phase of the HSLs learning process will concern the processing of all events results and their compilation into a set of clearly defined outcomes, such as in the form of recommendations for project partners, stakeholders or citizens, or other science communication products.

HSL operations and organisation will be as follows: each project partner realising an HSL will internally identify a manager of operations who will be in charge of the practical aspects of the laboratory realisation, such as the management of bookings, stakeholders, and other technicalities. The manager of operations will then participate in the HSL with the role of assistant to the laboratory, and to the facilitator. In the annexes, you will find an *HSL Event Planning Checklist* (Annex 1), concerning the tasks that the assistant would be in charge of, and the *HSL Technical Checklist* (Annex 2) for the realization of the HSL.

2.3 STAKEHOLDERS

In the context of the Hereditary research project, the following interested parties were identified, shown in *Table 4*:

Table 4. HEREDITARY stakeholders' categories

Stakeholders	Description
Clinicians (physicians, nurses and other health professionals)	A clinician is "an individual who utilises a recognised scientific knowledge base and has the authority to direct the delivery of personal health services to a patient" and "[...] has direct contact with patients and might or might not be a physician" (Institute of Medicine (US), 1994). In the case of Hereditary, clinicians are physicians, nurses and other health professional who work in close contact with neurodegenerative and gut microbiome disorders, including but not limited to: MS, ALS, FTD, PD.
Health and technology researchers	Health and technology researchers are individuals who carry out academic or scientific research in fields related to health and/or technology. In the case of Hereditary, we include researchers dealing with medicine, data science, or AI.
Patients or patients' association representatives	Patients are individuals who may receive medical care or treatment from healthcare professionals due to illness, injury, or other health-related issues. In the case of Hereditary, such illnesses can encompass neurodegenerative or gut microbiome disorder, including but not limited to: MS, ALS, FTD, PD. Patients associations, in the case of Hereditary, are organizations formed to support and advocate for individuals affected by the above-mentioned medical conditions.
Caregivers	A caregiver can be viewed as someone who takes care of a person who is young, old, ill, or disabled either as a family member or friend, or as a job. In the case of Hereditary, caregivers take care of a person with a neurodegenerative or gut microbiome disorder, including but not limited to: MS, ALS, FTD, PD.
Health institution administrators	Health institution administrators are professionals responsible for managing the operations of healthcare facilities such as hospitals and/or clinics. In the case of Hereditary, these administrators will be related the institution carrying out the HSL, i.e.: UNITO, UNIPD, RUMC, etc.
Policy-experts	Policy-experts include local government, municipal or ministry representatives, members, etc. In the case of Hereditary, the policy-experts will be identified among the local realities of the project partner carrying out the HSL, i.e.: Turin, Padua, Nijmegen, etc.

Because the HSL activities are customizable, the participation of all or select groups of stakeholders in discussions is allowed, to help align institutional and context specific needs with relevant outputs, however, it is important to maintain a balance between categories. This flexibility ensures that the activities can be tailored to the unique needs and characteristics of the different partners involved.

Reportedly beneficial strategies in planning stakeholder engagement include selecting stakeholders strategically to fit project needs, continuously involving them in the process, adapting to their practical needs, and clearly defining roles and expectations for the activities (Forsythe et al., 2015).

2.3.1 DIVERSITY

An 'inclusive' stakeholder engagement practice encourages the involvement of all members of society, regardless of their social status, sociocultural origin, gender, religious affiliation, literacy level, or age (C. Paleco et al., 2021). As such, we recommend to keep these aspects into consideration when defining the stakeholders to involve, trying to maintaining a heterogeneity of characteristics of participants where possible. Furthermore, given that Hereditary research potentially addresses disabling illnesses, it is important to support, where possible, disabled individuals' representation in HSL stakeholder engagement, to adequately gather their perspectives and needs.

2.3.2 STAKEHOLDERS INVITATION KIT

Invitation email for stakeholder

Subject: Health Social Laboratory Invitation, European Project HEREDITARY (HetERogeneous sEmantic Data integratIon for the guT-bRain interplaY)

Greetings,

Dear [Recipient's Name],

We are pleased to invite you to [City]'s [number] Health Social Laboratory, a stakeholder consultation session on the topic of data integration for the study of neurodegenerative and gut microbiome disorders. The initiative is an integral part of the European Project HEREDITARY, promoted and financed by the European Commission which is aimed at transforming disease detection approaches, preparing treatment response, and exploring medical knowledge in gut-brain disorders, through the integration of multimodal health data.

Event Details:

Date: [Date]

Time: 9:00 AM to 13:00 PM

Location: [Location], [City]

This half-day event will provide a platform for key stakeholders, including researchers, health experts, patient representatives and policymakers, to share their perspectives and contribute to the development of innovative solutions in this critical field. Your expertise and input will be invaluable to the success of this consultation.

Please confirm your attendance by [RSVP Date] by replying to this email or contacting [Contact Person] at [Contact Email/Phone Number]. We look forward to your participation and the opportunity to engage in meaningful dialogue.

We hope you are able to accept this invitation and we look forward to hearing from you.

Best regards,

[Your Full Name]

[Your Job Title]

[Your Organization]

[Your Contact Information]

Thank you email for stakeholder

Subject: Thank You for Attending [city] Health Social Laboratory!

Dear [Recipient's Name],

Thank you for participating in [City]'s [number] Health Social Laboratory on data integration for neurodegenerative and gut microbiome disorders.

Your insights and contributions were invaluable, and we appreciate the time and effort you dedicated to the event.

We look forward to keeping you updated on the progress and outcomes of the discussions. Please feel free to reach out with any further thoughts or questions.

Thanks again for your valuable input.

Best regards,

[Your Full Name]

[Your Job Title]

[Your Organization]

[Your Contact Information]

In the HSL Manual Annex, we provide an excel sheet "*Participant Planning Form.xlsx*" designed to keep track of stakeholder invitation and RSVP statuses, along with a variety of other useful notes.

In the added annexes, you will find: *Participant HSL Info Sheet* (Annex 3), *Hereditary Factsheet* (Annex 4*), Health Social Laboratory Participant Audio/Video Recording Consent Form* (Annex 5). These are documents which should be handed to the participants on the day of the HSL.

2.4 ACTIVITIES

HSLs will engage Hereditary stakeholders in in-person meetings of half-a-day, designed to run either in the am or in the pm. The events will last a total of 4 hours, distributed as 3 hours and a half of activity and 30 minutes of break.

2.4.1 PLENARY SESSIONS

The laboratories will begin and end with plenary sessions. The first one will concern the introduction of the HSL team, the Hereditary project, the agenda for the day, the thematic sessions, and other notes about the HSL. The second presentation, for the closing of the HSL, will include a recap of key insights, a dedicated note on filling out the evaluation report, and a space for final recommendations for the participants. A template of both presentations will be available in editable format in the HSL manual annex.

2.4.2 THEMATIC SESSIONS

The focal activity of HSLs will be thematic sessions dedicated to the discussion of relevant elements for the projects' prospective research outputs design, such as the study of the interactive data analytics platform and the process of popularization of medical terminology. To achieve this, three different thematic sessions were designed.

- *Technology*: as the Hereditary project aims to develop an interactive data-driven solution capable of supporting prevention, decision-making, and citizen's trust, it is very important to understand different stakeholders' perspective on this technology possible impact, clinical relevance and practicality. Stakeholders can also provide valuable insights about their needs and expectations regarding this type of technologies, for example, in terms of interface, accessibility, or content.
- *Terminology*: the Hereditary project is dedicated to making medical terms and concepts more understandable and accessible to the general public, it will achieve this by, for example, simplifying complex jargon, using more relatable language, and providing clear explanations to help non-experts better comprehend complex medical information.
- *Social and ethical issues*: the discussion of social and ethical issues related to the Hereditary research process could help address potential disparities in health literacy and ensure that the projects outputs respects patient privacy, autonomy, cultural sensitivity, and/or other stakeholders' needs.

2.4.3 AGENDA

HSLs activities can be programmed as shown in *Table 5*.

Table 5. Activities duration time

Duration	Activity
15 min	Welcome
20 min	Introduction
45 min	Thematic session A: Technology
15 min	Break
45 min	Thematic session B: Terminology
15 min	Break

Duration	Activity
40 min	Thematic session C: Social and ethical issues
35 min	Plenary
10 min	Conclusion

We advise to hold two separate breaks, one after each of the first two thematic sessions, to give participants the chance to disengage from the topic previously explored, and begin the following session about the next topic without prejudices.

2.4.4 GUIDELINES

It is important to remember that HSLs activities must strive to be:

- *representative*, ensuring that all relevant stakeholders are included in order to gather diverse perspectives and interests;
- *respectful*, with discussions being characterized by a courteous and professional tone;
- *collaborative*, encouraging a cooperative atmosphere where stakeholders can work together towards common aims;
- *transparent*, sharing information openly to build trust and clarity;
- *focused*, staying on topic and addressing the key issues and objectives of the sessions;
- *constructive*, aiming for solutions and positive outcomes, avoiding unnecessary conflict, (not to be confused with consensus seeking);
- *inclusive*, ensuring that everyone has an opportunity to speak and contribute, and valuing each participant's input and viewpoints;
- *timely*, where discussions are held within the specified timeframe, and reasonably respecting participants' schedules and deadlines.

2.4.5 BOOKLETS AND ACTIVITIES SHEETS

In the added annexes, you will find a *Booklet Checklist* (Annex 6), right before participant sheets for each one of the thematic sessions: *Thematic session A: Technology* (Annex 7), *Thematic session B: Terminology* (Annex 8), *Thematic session C: Social and ethical issues* (Annex 9).

In each HSL, participants should each be given a booklet, which will contain general information about the project, the laboratory and its activities, together with a Consent Form to sign, and an evaluation form to fill-in at the end of the session.

2.5 STAFF

Staff, in the form of a facilitators and an assistant, play a key role in HSLs.

A facilitator helps bring diverse perspectives together and foster meaningful discussion. By understanding and successfully fulfilling this role, the efficacy of HSLs collaboration can be enhanced, ensuring that every voice is heard and valued.

The above actor will be accompanied by the figure of the assistant. The person covering this role should support the organization and material execution of the HSLs, thus assisting the facilitators in his task of discussion guide. They ensure smooth operations and are the main contact point for the planning of the HSL.

The facilitator and assistant should be individually picked by the partner institution in charge for each different HSL. Observa is available for support in the task where needed.

2.5.1 PROFILES AND ROLES

The facilitator for HSLs should ideally have a professional background in the field of humanities, social sciences, science communication, or similar. As bonus, they could also have experience in citizen science or group dynamics management, and possess strong skills the field of active listening, impartial moderation, and conflict management.

The assistant for HSLs should possess strong organizational skills, attention to detail, effective communication abilities, and proficiency with digital collaboration tools.

2.5.2 FACILITATOR ROLE PRINCIPLES AND OBLIGATIONS

Facilitators in HSLs:

- guide discussions and debates;
- create a structured environment where participants feel comfortable sharing their views;
- do not contribute to the contents of the discussion, they are impartial;
- ensure that the conversation stays on track, aligns with the project's objectives, and that all participants adhere to the established guidelines;
- practice active listening, managing conflicts that arise during the discussion;
- summarize key points, including disagreements;
- do not influence the group to reach a consensus, they support differences in opinions.

They are furthermore obliged to follow the list of obligations below:

1. Get familiar with the project and HSL aims
2. Facilitate the discussion
3. Follow the agenda and script
4. Adhere to role principles
5. Collaborate with assistant
6. Fill the evaluation questionnaire
7. Read and integrate the HSL report filed by the assistant

2.5.3 ASSISTANT ROLE PRINCIPLES AND OBLIGATIONS

Assistants in HSLs:

- Manages logistics, supporting the partner institution in the organization of the HSL

- Coordinates stakeholder involvement (sending emails where appropriate, keeping track of attendance confirmation and so on)
- Serves as the primary contact for stakeholders and facilitates communication
- Manages materials and their translation in the partner institution language
- Observes the HSL and includes these observations in the final report
- Manages the recording and reporting of the HSL
- Ensures that the evaluation is carried out successfully at the end of the HSL

Assistants are furthermore obliged to follow the list of obligations below:

1. Keep track of the partner institution organization of the HSL, offering support where needed
2. Ensures the smooth involvement of participants and their invitation
3. Translate forms and participants booklets
4. Print all material on the day of the HSL
5. Assist in the organization of the room for the HSL
6. On the day of the HSL, coordinate the participants experience (welcome, booklet, activities sheets, evaluation form)
7. Record the discussion with two audio recorders
8. Take notes during observations
9. Provide pens and all papers and forms to participants and the facilitators
10. Fill the evaluation questionnaire
11. Fill the report form
12. Collects all evaluation questionnaires
13. Transcribe audio recording of HSL
14. Revise the transcription of the observed sessions for details and quality using the notes and the report form

In the annexes, you will find a *Facilitator Training Sheet* (Annex 10). This should be provided to the facilitator ahead of the Health Social Laboratories.

2.6 RECORDING AND REPORTING SET

HSLs have to be recorded in order to allow the extraction of meaningful insights from the activities, and when necessary, to place the different local results in relation with each other.

This systematic documentation will facilitate comprehensive analysis and comparison, ensuring that the data collected from various locations can be effectively integrated and interpreted.

Furthermore, maintaining thorough records and reports of the HSL will supports the activity transparency and accountability throughout the project.

2.6.1 INSTRUCTION FOR RECORDING AND REPORTING

HSLs need to be recorded for transcription purposes. Furthermore, a report form of the activity should be filled-out to accurately account the sessions. The assistant will be in charge of the task. The assistant should:

- Ensure recording devices (audio) are functional and appropriately set up.
- Perform a test recording to check for quality and clarity.
- Obtain necessary permissions and gather consent forms from all participants before recording.
- Save and back up recordings securely to prevent data loss.
- Fill out the HSL final report within 48 hours from the event to maximize accuracy.
- Review the recording with the facilitator for completeness and accuracy.
- Ensure all data and information are accurate and verifiable.
- Respect privacy and confidentiality; omit sensitive information if required.

In the annexes, you'll find *Health Social Laboratory Report Form* (Annex 11).

2.7 EVALUATION SET

The evaluation set is a crucial component designed to systematically assess the outcomes and impact of the project. It provides a structured framework for collecting and analysing data, enabling the extraction of meaningful insights from the activities. This comprehensive approach allows for the correlation of different local results, facilitating a holistic understanding of the project's effectiveness. Additionally, the evaluation set supports transparency and accountability, ensuring that all findings are meticulously documented and can be reviewed in relation to the project's objectives.

2.7.1 INSTRUCTION FOR EVALUATION PROCESS

HSLs need to be evaluated. Both the participants, the facilitator, and the assistant will be asked to complete evaluation questionnaires. The assistant will be in charge of the task. The assistant should:

- Print enough questionnaires and gather materials like pens and a collection box.
- Arrive early to set up the event space and organize everything you'll need.
- Let attendees know about the questionnaire and why their feedback is important.
- Hand out the questionnaires at a convenient time and explain how to fill them out.
- Make sure pens and hard surfaces are available, and offer assistance if needed.
- Collect the completed questionnaires discreetly to maintain confidentiality.
- Thank participants for their feedback and emphasize how valuable it is.
- Quickly review the collected questionnaires for completeness, and securely store them for later analysis.

In the annexes, you'll find *Health Social Laboratory Evaluation Form – Participant* (Annex 12), *Health Social Laboratory Evaluation Form – Facilitator and Assistant* (Annex 13), as well as *Participant Planning Form* (Annex 14), *HSL Intro* (Annex 15) and *HSL Conclusion* (Annex 16).

REFERENCES

The bibliographic entries are arranged in lexicographical order based on the key, following the APA style. This enables us to place the entries and citations in the table and text in any sequence, allowing for later sorting while ensuring consistency.

Key	Reference
Boaz et al., 2018	Boaz, A., Hanney, S., Borst, R., O'Shea, A., & Kok, M. (2018). How to engage stakeholders in research: design principles to support improvement. *Health research policy and systems*, *16*, 1-9.
Concannon et al., 2014	Concannon, T. W., Fuster, M., Saunders, T., Patel, K., Wong, J. B., Leslie, L. K., & Lau, J. (2014). A systematic review of stakeholder engagement in comparative effectiveness and patient-centered outcomes research. *Journal of general internal medicine*, *29*, 1692-1701.
Deverka et al., 2012	Deverka, P. A., Lavallee, D. C., Desai, P. J., Esmail, L. C., Ramsey, S. D., Veenstra, D. L., & Tunis, S. R. (2012). Stakeholder participation in comparative effectiveness research: defining a framework for effective engagement. *Journal of comparative effectiveness research*, *1*(2), 181-194.
Forsythe et al., 2016	Forsythe, L. P., Ellis, L. E., Edmundson, L., Sabharwal, R., Rein, A., Konopka, K., & Frank, L. (2016). Patient and stakeholder engagement in the PCORI pilot projects: description and lessons learned. *Journal of general internal medicine*, *31*, 13-21.
Hartzler et al., 2013	Hartzler, A., McCarty, C. A., Rasmussen, L. V., Williams, M. S., Brilliant, M., Bowton, E. A., ... & Trinidad, S. B. (2013). Stakeholder engagement: a key component of integrating genomic information into electronic health records. *Genetics in Medicine*, *15*(10), 792-801.
Hesse et al., 2010	Hesse, B. W., Hansen, D., Finholt, T., Munson, S., Kellogg, W., & Thomas, J. C. (2010). Social participation in health 2.0. *Computer*, *43*(11), 45-52.
Institute of Medicine (US), 1994	Institute of Medicine (US) Committee on the Future of Primary Care; Donaldson, M., Yordy, K., Vanselow, N., editors. Defining Primary Care: An Interim Report. Washington (DC): National Academies Press (US); 1994.
Kjellström & Mitchell, 2019	Kjellström, S., & Mitchell, A. (2019). Health and healthcare as the context for participatory action research. *Action Research*, *17*(4), 419-428.
Kujala et al., 2022	Kujala, J., Sachs, S., Leinonen, H., Heikkinen, A., & Laude, D. (2022). Stakeholder engagement: Past, present, and future. *Business & Society*, *61*(5), 1136-1196.
Lehoux et al., 2013	Lehoux, P., Miller, F. A., Hivon, M., Demers-Payette, O., & Urbach, D. R. (2013). Clinicians as health technology designers: Two contrasting tales about user involvement in innovation development. *Health Policy and Technology*, *2*(3), 122-130.

Key	Reference
Lemke and Harris-Wai, 2015	Lemke, A.A. & Harris-Wai, J.N., 2015. Stakeholder engagement in policy development: challenges and opportunities for human genomics. *Genetics in Medicine*, *17*(12), pp.949-957.
Paleco et al., 2021	Paleco, C., García Peter, S., Salas Seoane, N., Kaufmann, J., Argyri, P., Vohland, K., ... & Wagenknecht, K. (2021). Inclusiveness and diversity in citizen science. *The science of citizen science*, *261*, 261-282.
Strasser et al., 2019	Strasser, B., Baudry, J., Mahr, D., Sanchez, G., & Tancoigne, E. (2019). " Citizen science"? Rethinking science and public participation. *Science & Technology Studies*, *32*(2), 52-76.

ANNEXES

Number	Name
1	HSL Planning Checklist
2	HSL Technical Checklist
3	Participant HSL Info Sheet
4	Hereditary Fact-Sheet
5	Participant Audio-Video Consent Form
6	Participant Booklet Checklist
7	Participant Sheet Thematic Session A
8	Participant Sheet Thematic Session B
9	Participant Sheet Thematic Session C
10	Facilitator Training Sheet
11	HSL Report Form
12	Evaluation Questionnaire Participant
13	Evaluation Questionnaire Facilitator And Assistant
14	Participant Planning Form
15	HSL Intro
16	HSL Conclusion