Appendix A

Interviews research guide.

Interview script

Hi, my name is ----. I'm doing my Master Project at TU DELFT, in the Strategic Product Design Master. I would like to know more about your role as a [Researcher / Developer / Designer], and the processes/work? you do in 4D PICTURE? So, I would like to invite you to a 45-minute conversation, where I will ask you some questions to get to know you and your work better.

The idea is to audio-record the interview just for us to go back to hear, in case we need so (it is not going to be used for anything besides this academic research). Is this okay for you?

Before we start, I just want to let you know that this is just a conversation. There are not right or wrong answers. I want to know about your experiences and points of view so please feel free to mention everything you think is important.

Okay then let's begin!

Interview Goal:

Identify elements influencing technology implementation within a real project in a cancer-care context and how these elements interact between them.

Interview questions:

1. About your role in 4D PICTURE

2. What is the process of Design/development of the Decision Support Tools?

    a. Who is involved in this process

3. What are the challenges when you collaborate with patients, medical staff, caregivers in the process of creating the Decision support tools?

4. Is there any current plan or strategy to implement the DST? Can you describe it

5. Can you identify challenges and enablers of the implementation of technology?

6. What is the process for implementing the decision support tools?

7. How is the collaboration with patients, medical staff, caregivers for implementing the DST in the hospitals and the care journey?

8. How the contexts affect the implementation?

9. What things are important to consider when implementing decision support tools?

10. What steps you think are important to implement the DST?

    a. Who would you involve?

    b. What would be important to take care of before implementing?

Appendix B
Ethics approval

Date 16-Jun-2024
Correspondence hrec@tudelft.nl

Human Research Ethics
Committee TU Delft
(http://hrec.tudelft.nl)

Visiting address
Jaffalaan 5 (building 31)
2628 BX Delft

Postal address
P.O. Box 5015 2600 GA Delft
The Netherlands

Ethics Approval Application: Designing a Service Design framework for the designers, researchers and developers of 4D Picture to create implementation strategies for the designed Decision support tools.
Applicant: Sanchez Villegas, Carolina

Dear Carolina Sanchez Villegas,

It is a pleasure to inform you that your application mentioned above has been approved.

Thanks very much for your submission to the HREC which has been approved.

In addition to any specific conditions or notes, the HREC provides the following standard advice to all applicants:
• In light of recent tax changes, we advise that you confirm any proposed remuneration of research subjects with your faculty contract manager before going ahead.
• Please make sure when you carry out your research that you confirm contemporary covid protocols with your faculty HSE advisor, and that ongoing covid risks and precautions are flagged in the informed consent - with particular attention to this where there are physically vulnerable (eg: elderly or with underlying conditions) participants involved.
• Our default advice is not to publish transcripts or transcript summaries, but to retain these privately for specific purposes/checking; and if they are to be made public then only if fully anonymised and the transcript/summary itself approved by participants for specific purpose.
• Where there are collaborating (including funding) partners, appropriate formal agreements including clarity on responsibilities, including data ownership, responsibilities and access, should be in place and that relevant aspects of such agreements (such as access to raw or other data) are clear in the Informed Consent.

Good luck with your research!

Sincerely,

Appendix C

Definitions

Domains defined:

Adaptation over time:
This domain refers to the ongoing process by which healthcare organizations and their staff continuously integrate, adjust, and optimize the use of the technology long after the initial implementation phase.

Adopters:
This domain refers to the individuals or entities who decide to make use of the technology or intervention. In the cancer-care context, there are adopters that act as direct users of the innovation such as Clinicians, Caregivers and the Patients; and the ones who indirectly adopt the innovation such as Managers and Decision makers and Healthcare organisations.

External actors:
This domain refers to individuals, groups, or organizations that influence, support, or regulate the adoption and use of new technologies. These actors play critical roles in shaping the environment in which healthcare technologies are developed, implemented, and utilized.

External setting:
The setting domain refers to the external context or environment to the organisation in which the technology is implemented.

Illness:
This domain encompasses the health condition being addressed (in this case, cancer).

Implementation process:
This domain involves the systematic introduction and integration of new technologies into healthcare settings. This process facilitates that the technology is utilized by healthcare professionals and organisations and eventually adopted.

Innovation deliverers:
This domain refers to the teams and individuals who are in charge of the implementation.

Organisational setting:
The setting domain refers to the internal context or environment to the organisation in which the technology is implemented.

Technology (or innovation):
This domain refers the new idea, practice, or technology being introduced to the context and its characteristics. For example, in the case of 4D PICTURE, this refers to the Metaphor menu, the Prognostic models and the Metro mapping.

Value perception:
This domain refers to how stakeholders, such as healthcare organisations, patients, managers, clinicians and caregivers perceive the benefits and worth of the technology.

Elements defined:

Adaptability: The ability of the technology and its implementation process to be flexible and responsive to the specific needs and circumstances of different healthcare settings.

Adoption: The initial decision and actions taken by a healthcare organization to begin using a new technology.

Cancer researchers: Cancer researchers are scientists and clinicians dedicated to studying cancer, developing new technology, treatments, and improving existing therapies through research and clinical trials.

Caregivers: This refers to the individuals who provide support to patients during their illness. They can be family members, friends, or hired individuals that provide care to the patient.

Characteristics of technology: The specific attributes and features that define the technology and influence its adoption and integration.

Change workload: The impact of the new technology on the workload of healthcare professionals and administrative staff.

Clinicians: This element refers to healthcare workers who are directly involved in providing medical care to patients. This term encompasses physicians, nurses and assistants

Comorbidities: The presence of one or more additional diseases or medical conditions that occur simultaneously with a primary disease or condition in a patient. These comorbidities can complicate the diagnosis, treatment, and

management of the primary illness and can significantly affect the patient's overall health outcomes.

Cost of technology: All the expenses associated with adopting and integrating new technological solutions within healthcare settings (acquisition cost, maintenance cost and implementation costs)

Culture: Refers to the values, beliefs, norms, behaviours, and customs that are shared by a community (such as the region, country or state).

Data and information generated by the technology: the various types of data and insights that are produced through the use of technological tools and systems.

Data management: This element refers to the systems, processes, and practices related to the management, analysis, and utilization of data and information in the organisation (for example the data collection of patients and its management).

Ethics boards: groups of experts that review and oversee the ethical aspects of research and implementation projects involving new healthcare technologies.

End of life: refers to the final stages of life of a patient (days, weeks, or months). This involves managing symptoms, providing comfort, and addressing psychological, social, and spiritual concerns for the individual and their family.

Feedback: The collection and analysis of user experiences and performance data regarding the technology during and after its implementation.

Financial capacity: This element refers to the economical setting of the organisation, the management and utilization of monetary resources in the organisation.

Healthcare organizations: This refers to the organisation as an entity that delivers health services. They have intrinsic characteristics such as the organisational culture and the financial capacity.

Healthcare systems: Refers to the way that healthcare delivery is organized in a specific region or country. This encompasses aspects like the healthcare coverage, the insurance dynamics, the infrastructure and funding).

Innovation deliverers: The individuals or teams (internal and external to the organisation) responsible for introducing, managing, and supporting the implementation of the new technology.

Nature of the illness: Refers to the specific characteristics, type, and causes of the patient's medical condition.

Need of the technology: The extent to which the technology

addresses specific, recognized problems or gaps for users in the healthcare setting.

Organisational culture: This are the set of norms, values, assumptions and visions that the organisation has subconsciously constructed with time and influences its employees and collaborators.

Organisational managers: This refers to the individuals that ensure that the healthcare organisation functions properly and make strategic decisions in the organisation. They can be Chief officers of the organisation, board members, heads of departments or team leads.

Patients: This refers to the individuals that are experiencing cancer and make use of the healthcare services.

Patient Setting: This refers to the physical environment or context of the patients, it encompasses the tangible and intangible resources available in their context (such as the access to water, light, living conditions, social conditions).

Policy makers and government: are institutions and officials responsible for creating and enforcing laws, regulations, and policies that govern healthcare practices and technology use

Political environment: This element refers to the legal and regulatory aspects, and the political landscape that influence operations, decision-making, and policies of organisations and individuals.

Priority for the adopter: The level of importance and urgency assigned to the technology by the potential users or adopting organization.

Progression of the illness: Refers to how the illness evolves over time, including stages, prognosis, and potential complications.

Relative advantage: The perceived benefits and improvements the new technology offers compared to existing solutions or other options in the market.

Severity of the illness: This element indicates the degree of impact or seriousness of the illness on the patient's health, well-being, and functional status.

Structure and operation: This is referring to the way that the organisation operates internally and how it organises the individuals to produce a service.

Sustainability: Ensuring the technology remains viable and effective over the long term and expanding its use to other areas or departments as needed.

Technological setting: This element refers to the current technical or technology elements that Healthcare organisation use and its capacity and infrastructure to

support the technology. This encompasses software's, apps and systems, machines, tools and security barriers.

Technology landscape: The broader technological environment outside an organization that influences and shapes its technology strategies, investments, and innovations. This can be tech-trends, new infrastructure, technological developments and others.

Training: The structured process of educating and equipping healthcare professionals and staff with the necessary knowledge and skills to effectively use the new technology (such as training sessions, ongoing education, practice, manuals, and support).

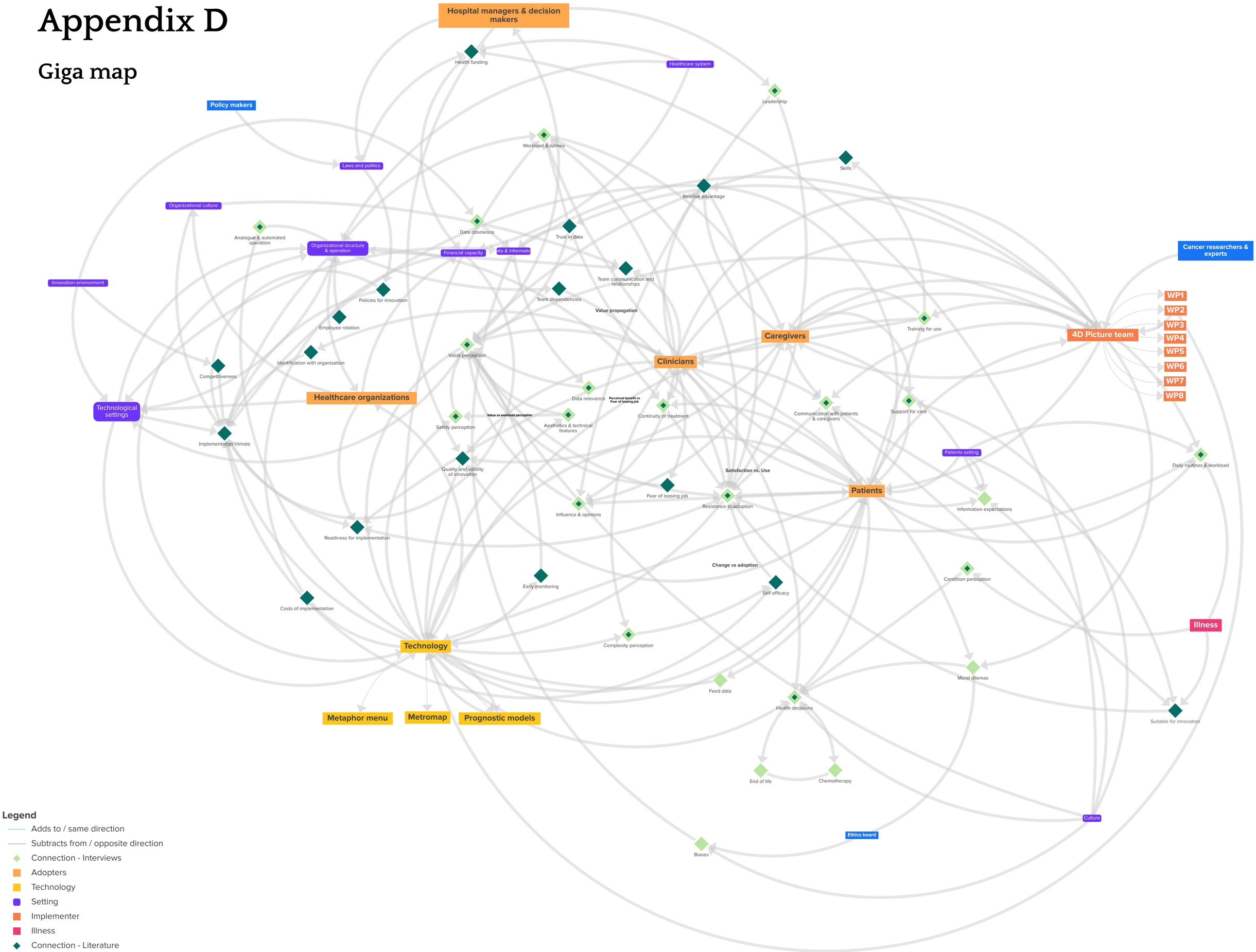
Treatment: The medical care, procedures, and interventions provided to a patient to manage or cure a health condition, alleviate symptoms, or improve quality of life.

Trialability: the possibility of experimenting new technology or innovation before full-scale implementation.

Validity of technology: the extent to which a technological solution accurately and reliably achieves its intended purpose and produces credible and useful results.

Appendix D

Giga map



Legend

- Adds to / same direction
- Subtracts from / opposite direction
- Connection - Interviews
- Adopters
- Technology
- Setting
- Implementer
- Illness
- Connection - Literature
- Connection - Literature & interviews
- External actors

Appendix E

Validation research guide

Interview script

Hi again (name of participant), how are you?

I invited you today because as part of my thesis project I wanted to validate with you that I have created from the literature review and information that you and your colleagues shared with me.

So, this session is going to last about 45 minutes, where I'm going to share my screen and explain some concepts, and then discuss with you some perceptions about that. Finally, I will ask about your perceptions. Is this okey with you?

Additionally, the idea is to audio-record the interview just for me to go back to hear, in case we need so (it is not going to be used for anything besides this academic research). Is this okay for you?

Before we start, I just want to let you know that this is just a conversation. There are not right or wrong answers. I want to know about your experiences and points of view so please feel free to mention everything you think is important.

Okay then let's begin!

Interview Goal:

Are the factors included in the map (domains, elements, and connections) perceived as relevant for addressing the needs and challenges of the 4D PICTURE project?

What are the Team perceptions on the usability of the map in relation to the 4D PICTURE project?

- How do team members perceive the usefulness of the map in the various stages of the 4D PICTURE project?
- How do the team perceived that the map can be used by different roles of the 4D PICTURE project?

Interview questions:

Part 1

1. Can you recognize these factors in the context of 4D PICTURE? (Question for each of the domains).

If yes: How or in what situations you recognize them?

If not: Do you think they could be present in other moments?

2. Do you think is relevant to think in these different elements to have a successful implementation of the tools developed by 4D PICTURE?

3. Is there anything that you can think of right now (that we haven't discussed yet) that we are leaving out with the framework that is relevant for the context of the project?

Part 2

1. Do you think is relevant for you in your work to know how different factors interact and influence each other?

2. Can think of any cases or scenarios where you could use this information in your work in 4D PICTURE?

3. Can you recall any situation this information would have helped you to do your work in a better way?

4. Do you think is relevant for 4D PICTURE to know how all these factors connect between them?

5. In what parts of the 4D PICTURE project (like in the planning, design, validation) do you think this information can be more valuable?

6. Do you have any suggestions or recommendations for improving the visualization to better meet your needs and preferences (please share any ideas for new features, enhancements, or modifications that would enhance its usability and effectiveness)

Validation

Appendix F

Validation process

Research answers

Participant 1 | Participant 2 | Participant 3 | Participant 4

Are the factors included in the framework (domains, elements, nodes, and connections) perceived as relevant for addressing the needs and challenges of the 4D PICTURE project?

Can you recognize this factors in the context of 4D PICTURE?

It's just like the base of the whole thing and like with the decision making support tools like the prognostic modelling that are being developed. That's also a really known on. Of course

The Illness and the Innovation are the base for the 4D PICTURE project (the innovation is designed around the illness) therefore there can not be implementation without these elements.

Caroline

experience something before that you

For the adopters is important to be able to try, test the innovation before committing to it. This helps them to experience the value of the innovation and assess if they like to adopt it or not. - Trial-ability

Caroline

OK. If I do agree with both thinus that

Important to define these better and fully what each of the elements mean

Is important that in the visualization/framework each of the elements are fully defined and comes with some examples if possible. As well for the connections.

Caroline

Yeah, I recognize it is not really my field of expertise, because sometimes I'm a

The healthcare organization can be seen more as a setting that covers the different settings of the organization because there are multiple factors that influence the adoption, instead of just one adopter.

Caroline

So as in like a urologists or oncologists

Not all the people on the project (all the implementers) have the same level of contact with the different elements. Additionally, the type of relationship might also change depending on the actor. Nevertheless, there are some relations that even if they don't happen today, it would be valuable to happen.

Caroline

tools to be used.

For some cases (in the current process) there is no clear definition on who should be involved in the implementation or what is the process to implement.

Caroline

and decision makers would be implemented in clinical practice and.

Yeah, but for the prognostic tools, I think actually that's the gap. The gap is there because actually there's no clear way or on who to go to.

I do think that metro mapping the tool definitely would be implemented in this way. So it goes like going in the health care organization and the managers and decision makers would like implemented in clinical practice and.

Yeah, but for the prognostic tools, I think actually that's the gap. The gap is there because actually there's no clear way or on who to go to.

Yo te diría que con los que más nos estamos encontrado son con la organización estructural y un poco también el tema de Cultura. Aquí el sanatio, por ejemplo, pero los

Organizational structure and culture are two of the most common-elements that the design team has to deal with when developing the metro-mapping. Is important to take into account how they function and recognize the things that can be changed and the ones that can not be changed. in order to design an innovation that can be successful.

Caroline

cambiar de opinión sobre su sistema.

¿Y en cuanto a cultura? Sí, claro, yo sigo comparando con Dinamarca, por ejemplo. Cuando estuve allí. Aquí, por ejemplo, los médicos es como más. Tienen este confidence

Different cultures have different ways of relationships between patients and clinicians, those differences affect the way a patient accepts the treatment or even gets options about it.

Caroline

¿En cuanto a innovación? Pues sí, también hay muchos ensayos médicos que también se se introduce en el servicio de tanto de análisis como el tratamientos.

Do you think is relevant to think in these different elements to have a successful implementation of the tools developed by 4D PICTURE

Well, yeah. So it is important, but it's sometimes it's also something. Well, I did some, I know innovation, research, purchase and sometimes it's also can also be a good strategy to just begin and then and then gradually without any support.

The insurances also should be considered as actors in the implementation, the costs, reimbursements, and coverage changes that the innovation generate, must be approved by them.

Caroline

makes a the difference is very visible and it can also be from an ethical side.

Somewhat contradictory answer on one side, not at all as in, I think if

Caroline

Even though if some characteristics of the innovation should be equal, like the sase, the illness dictates a lot of differences that might influence the illness. For example, it might influence on the patients mood, energy level, decision load, and others.

Caroline

may be very timid at this: How many decisions are they taking at the same time? Can you split things up? You know how much bad news have they already had? What is their experience if you're showing in your decision support tool like chemo? Uh, but there are different stages where you can start different types of chemo. How does you might want to explain how this chemo differs from the chemo Dev already had, so yes, good to have

Caroline

The managers are relevant because even if they are not the direct users of the innovation, they are in charge of approving or changing the process of doctors that is needed for the implementation to succeed or be used.

Caroline

The reason why healthcare, uh, [illegible]

The healthcare organizations are important because there are settings specific to the organization that need to be adjusted (or that the innovation needs to adjust to) in order to implement successfully the innovation.

Caroline

difficult they won't

So there so for in the first example, there's an actual person that has influence, and in the second case it's it's an organizational thing that has influence another single person

Caroline

Some elements are important to be considered even if they can not be changed by the implementation or by an actor. This is why, is important to know them to be aware of them.

Caroline

Patients tell us what they hope to know. So in which information do they find relevant and to know, clinicians also provide a little bit, a little bit of what is feasible, because for example some information is not available on the clinician level, so we cannot include it in the models because if if we do, they won't know anyway. So clinicians provide a little bit of the context of the appointment and what is possible or not or feasible or Yeah. And caregivers a little bit the same of what the patient. So what is relevant for them to to know to hear about or how it should be presented? Yeah.

Yeah, the law and politics, I think it's

Caroline

[illegible] spective of some participants, some are relevant to be considered in the development of the innovation, be considered in the For example the Law & politics ordered in later stages of the

Caroline

there are the most things that we would consider for for the development of the tool.

Is there anything that we are leaving out with the framework that is relevant for the context of the project?

So between the the three types of

Caroline

is important to acknowledge possible differences in the experience of the illness and it's different characteristics.

Caroline

take that into account or really make sure that the tool supports with those aspects of that illness and those aspects.

There are other factors that might affect the decision making depending the illness. Is important to acknowledge the differences between them (prostate cancer, melanoma and breast cancer). For example that there might be impotence, or impact on the sexual function; on the other hand breast cancer is more impacted on the body awareness.

Caroline

So I would also for instance mention like the four the PPI boards like the ones that are the patient experience people, because I would I think for implementing it is very important that you get a lot of feedback from

Culture and country are also relevant factors that influence the development of the tool. This also influences the clinicians and how they interact with the patients.

Caroline

doctor you're help more variety.

Uh Denmark is looking at decision support tools, or at least metro mapping for like physical therapist etc. I don't think they would count themselves as clinicians, so that that might be a little bit of a search for the right word, but I think your intention is there.

But if you start looking at organizational things that have influenced the list of the tool. It's also healthcare Insurance. Will they cover the five minute longer consultations? So I don't know how much I don't know what else is coming, but I think it and I do agree it's important. But I think there's a lot of details on underneath that's.

I don't know for sure. I'm we're still looking ourselves. It's can be that, uh, other people like

QP is an important actor to consider, they might be external to the hospitals but have contact with the patient and acts as a bridge with the new clinician.

Caroline

has questions. Should I do chemo?

So I think that like reimbursements by uh insurances would be under the healthcare system, I think.

Clear could be something you know in the final version to have explanation somewhere I can understand why you chose to split those, but it could be nice for users to have. What does this mean? And just I don't know how far and find it.

Because I'm also searching a little bit, I

From the perspective of some participants, it would be helpful to have further steps on the connections or what things are important to consider in that specific element. This would be helpful for them to develop or improve the innovation.

Caroline

And then I would expect in this overview those three (illness) factors and then maybe a stories on how that that you know that that, that stage we just discussed a couple of examples of how that can influence people.

And I think I think you're you're heading the right direction. Designers like really tangible stuff. So uh, of course I completely agree and

Do you think is relevant for you in your work to know how different factors interact and influence each-other?

The participant think that it would be useful to have something that helps them to contextualize themselves on the projects setting and the relationships of factors before starting to develop solutions.

Caroline

And might influence the the output.

Participant consider important to be able to have something that helps to review if they are considering all the elements in the development of the innovation.

Caroline

The participants consider that it could be helpful to have the relationships tailored to the different kinds of cancer.

Caroline

is relevant for the participants to see the interactions between elements, it would help in the implementation process but also in the design and exploration of the service.

Caroline

Do you think is relevant for 4D PICTURE to know how all these factors connect between them?

So I think that it could be relevant to look at it like with after like I think after year two or three like when this is really. When like the first face is done, there are some actual tools, then it could be relevant to see if you're not missing out.

So I think in the beginning it has more like a of a learning. It's like a learning experience because you get introduced to all these reality from the start instead of learning on the go because that's what happened with me. I learned on the go. I learned from other contacting with other researchers, whatever, but if it's already here, it can be like a nice introduction to the context

Yeah. Hmm I think. Umm, I think it's usually more useful for the people that are in charge of, like really developing the tools. For

Participants consider that this could be more useful for the teams who are more involved in the development of the innovation, and this could help team leaders to have an overview of the relevant things to look after in the development process

Caroline

researchers. So I think definitely the the people that are immediately responsible to be the the leading leading, the the development of the tool.

Quizá, o sea, creo que es suficiente,

It would be helpful for participants to be able to see the most relevent connections, the ones that have more impact on each other or that will make the most impact on others.

Caroline

is important to define really well each of the elements so it can be understood by everyone.

Caroline

gerencia general de lo que es el

Even if the visualization of the system is helpful for all the project (mostly for the managers). It could be more actionable for the people that are in direct contact with the development of the tools and the ones in charge of the implementation

Caroline

quién va a desarrollar las herramientas.

In what parts of the 4D PICTURE project (like in the planning, design, validation) do you think this information can be more valuable?

So I think then it could be relevant to look at it like with after like I think after year two or three like when this is really. When like the first face is done, there are some actual tools, then it could be relevant to see if you're not missing out.

That's something more for the beginning. OK, that when you start thinking about how do I develop this tool? Oh yeah, it should be.

Participants consider that this could be useful for the beginning of the project to give ideas for the teams to look for when developing the physical tool.

Caroline

you could maybe also use this checklist. OK, let's go through it has I thought of who is aiming to reimburse me for this

Participants consider that this could be useful for the development of the tool if is more detailed for the project, as it could work like a checklist to help evaluate if the team considered all the influences.

Caroline

until you have some sort of idea. So 2 two or three times in the beginning it's like, maybe you have like about these factors and once you have an ID to check it, am I heading in the right direction? Am I forgetting anything?

I think actually from the start. And then you kind of need to revisit it while you developed the tool. So every

Participants consider that this could be useful for the development of the tool if is more detailed for the project, as it could work like a checklist to help evaluate if the team considered all the influences and also how the innovation changes those influences or contexts.

Caroline

might make the tool difficult to to be used, so kind of because it's a very complex thing like reality. And sometimes when developing a model, you might think that you're considering everything and that the tool will be very easily adopted. But then if you revisit the map let's say, then you can see, oh, actually we kind of forgot to to how how this could be conflicting with this issue here with this factor and then you can and maybe design your model considering that there was just one thing that I think it would be relevant and.

Bueno, yo creo que esto se me ocurre dos fases o dos partes en las que podría ser un interesante una seria al final de la fase de investigación o la propia fase de

The tool could be most useful for the research stage of the project (during and end of the phase, as it would help the team to visualize the different elements that affect the innovation. Additionally it would be helpful for the design process because when designing with other actors these will help as guide on to where we can solve some tensions or as trigger questions for design. Finally in the design process it will help to foresee how the proposals change the system and the consequences.

Caroline

generar las citas o cualquier cosa, sabes? ¿Y esto puede puede ayudarnos a ver un poco qué es lo que qué es lo que le pasa?

Tú sabes, yo creo que con el mapa tal cual lo tienes, me parecería. Oh más que más que suficiente para poderlo entender perfectamente y poder entender y poder ver las complejidades. ¿Cómo están Unidas? Eso lo único que se me ocurre. ¿Marcar igual las que más aceptación o los puntos que más afecten al resto? ¿Sabes? Igual no tanto las las combinaciones entre puntos.

Are the factors included in the framework (domains, elements, nodes, and connections) perceived as relevant for addressing the needs and challenges of the 4D PICTURE project?

How do team members perceive the usefulness of the framework in the various stages of the 4D PICTURE project?
How do the team perceived that the framework can be used in different activities od the 4D PICTURE project?

The Domains of the "illness" and "innovation" are the base to all the project, therefore they can not be excluded from the system.

Caroline

All the elements identified are considered relevant for the development and implementation of decision support tools.

Caroline

The Illness and the Innovation are the base for the 4D PICTURE project (the innovation is designed around the illness) therefore there can not be implementation without these elements.

Caroline

Culture and country are also relevant factors that influence the development of the tool. This also influences the clinicians and how they interact with the patients.

Caroline

The managers are relevant because even if they are not the direct users of the innovation, they are in charge of approving or changing the process of doctors that is needed for the implementation to succeed or be used.

Caroline

The healthcare organizations are important because there are settings specific to the organization that need to be adjusted (or that the innovation needs to adjust to) in order to implement successfully the innovation.

Caroline

For the adopters is important to be able to try, test the innovation before committing to it. This helps them to experience the value of the innovation and assess if they like to adopt it or not. - Trial-ability

Caroline

The healthcare organization can be seen more as a setting that covers the different settings of the organization because there are multiple factors that influence the adoption, instead of just one adopter.

Caroline

Organizational structure and culture are two of the most common-elements that the design team has to deal with when developing the metro-mapping. Is important to take into account how they function and recognize the things that can be changed and the ones that can not be changed. in order to design an innovation that can be successful.

Caroline

Different cultures have different ways of relationships between patients and clinicians, those differences affect the way a patient accepts the treatment or even gets options about it.

Caroline

There are other relevant actors that must be considered in the system: The GP and the insurances.

- GP: This actor can be considered separate from the clinicians in the organisation as they are not part of the hospital, nevertheless they act as bridges from the patient to the Clinician. They know the patient history and might have closer relationship with the patient.
- **The insurances:** This is an external organisation to the hospitals, and are related to the healthcare system. They are in charge of approving treatments, defining the coverage of healthcare and review some of the changes in cost that the innovation generates.
- **Doctors vs nurses:** The role that the doctors and nurses have are different and this affects the way they relate to other elements.

Caroline

QP is an important actor to consider, they might be external to the hospitals but have contact with the patient and acts as a bridge with the new clinician.

Caroline

The insurances also should be considered as actors in the implementation, the costs, reimbursements, and coverage changes that the innovation generate, must be approved by them.

Caroline

There should be difference between Doctors and nurses, as they are with different roles in the organizations and the processes they do differ. These differences change how they relate to the tool and to patients.

Caroline

There exists different interests between the users, which can cause tensions in development and the implementation of the innovation. So important to think how to balance them

Caroline

Progression of the Illness and characteristics of the patients are factors that influence the level of involvement of the caregivers. In these cases caregivers are the ones who have more influence on the decisions of the patients, have the information and are the ones who adopt or abandon the innovation

Caroline

A part from the progression and aggressively of the illness, the secondary effects of the illness and treatments are a relevant element to take into account in relation to the patient and their decisions.

Caroline

Is important to define really well each of the elements so it can be understood by everyone.

Caroline

The tool should have all the definitions and examples of each elements for it to be clear for the team on what it means or what is it referring to.

Caroline

A part from the nature, progression and severity of the illness, is important to consider the secondary effects of the illness (and the treatment) on the patient.

Caroline

Some of the relations between the actors can be tensions between them that might affect the implementation of the innovation. The tensions can also influence on the decision making of the users.

Caroline

For some cases (in the current process) there is no clear definition on who should be involved in the implementation or what is the process to implement.

Caroline

Important to define these better and fully what each of the elements mean

Is important that in the visualization/framework each of the elements are fully defined and count with some examples if possible. As well for the connections.

Caroline

Is important to define really well each of the elements so it can be understood by everyone.

Caroline

In general, the identified elements and connections are relevant for addressing the challenges in development and implementation of the innovation in 4D PICTURE. Nevertheless, the participant consider that the relevance of each element changes per team and the type and closeness of the interaction might also vary.

Caroline

During different stages of the project the relevance or relationship of some elements in the teams change. Additionally, is important to consider that some of the elements might not be "changeable", but the constrains are important to consider in the process.

Caroline

From the perspective of some participants, it would be helpful to have further steps on the connections or what things are important to consider in that specific element (Opp), as they might be too open to be actionable.

Caroline

Some elements of the innovation might be setting-specific and others not. Is important to take into account this differences.

Caroline

Some elements are important to be considered even if they can not be changed by the implementation or by an actor. This is why, is important to know them to be aware of them.

Caroline

Not all the people on the project (all the implementers) have the same level of contact with the different elements. Additionally, the type of relationship might also change depending on the actor. Nevertheless, there are some relations that even if they don't happen today, it would be valuable to happen.

Caroline

In the development process of the tools there might be some things that have more relevance than others. There are some elements that are going to adapt eventually but there are other that need to be taken in to account and thought of actively.

Caroline

Not all the roles in the project have the same level of contact with the different elements; and even if they acknowledge the relevance of taking in to account their influences and relationships, they don't know how to do it.

Caroline

How do team members perceive the usefulness of the framework in the various stages of the 4D PICTURE project?
How do the team perceived that the framework can be used in different activities od the 4D PICTURE project?

The participants consider that the tool should be tailored to the different types of cancer, as there are some differences that are important to consider in the development of the innovation.

Caroline

The participants consider that the tool should highlight the most important connections between the elements, the ones that have more influence or are the most influenced.

Caroline

The participants consider that it could be helpful to have the relationships tailored to the different kinds of cancer.

Caroline

Even though if some characteristics of the innovation should be equal, like the sase, the illness dictates a lot of differences that might influence the illness. For example, it might influence on the patients mood, energy level, decision load, and others.

Caroline

Is important to acknowledge possible differences in the experience of the illness and it's different characteristics.

Caroline

There are other factors that might affect the decision making depending the illness. Is important to acknowledge the differences between them (prostate cancer, melanoma and breast cancer). For example that there might be impotence, or impact on the sexual function; on the other hand breast cancer is more impacted on the body awareness.

Caroline

It would be helpful for participants to be able to see the most relevent connections, the ones that have more impact on each other or that will make the most impact on others.

Caroline

The participant think that it would be useful to have something that helps them to contextualize themselves on the projects setting and the relationships of factors before starting to develop solutions.

Caroline

The tool could be most useful for the research stage of the project (during and end of the phase, as it would help the team to visualize the different elements that affect the innovation. Additionally it would be helpful for the design process because when designing with other actors these will help as guide on to where we can solve some tensions or as trigger questions for design. Finally in the design process it will help to foresee how the proposals change the system and the consequences.

Caroline

Participant consider important to be able to have something that helps to review if they are considering all the elements in the development of the innovation.

Caroline

The participants consider that it could be useful for the development of the tool if is more detailed for the project, as it could work like a checklist to help evaluate if the team considered all the influences and also how the innovation changes those influences or contexts.

Caroline

is relevant for the participants to see the interactions between elements, it would help in the implementation process but also in the design and exploration of the service.

Caroline

From the perspective of some participants, it would be helpful to have further steps on the connections or what things are important to consider in that specific element (Opp), as they might be too open to be actionable.

Caroline

The participants consider that the tool can be used in different points of the project. The purpose of use changes depending on the moment.

- **In the beginning of the project:** For this stage the purpose of the tool is focused on contextualising the team in to the setting of the innovation and the different elements that interact.
- **In the research stage:** The purpose of the tool in this stage is to visualise the different elements that affect the innovation.
- **In the development of the innovation:** For this stage, the purpose of the tool is focused on helping the team to consider the elements, how they affect each other and what design actions (in the form of decisions) they might have to make. Additionally in this stage it could help guide interviews and co-creation with patients to trigger conversations of different points that could affect the innovation. Finally, it would help to foresee the effects that a proposal could have on the rest of the system.
- **Review of the innovation:** For this stage, the purpose of the tool is to evaluate if the innovation takes into account all the elements that influence it and assess how this might affect the system.

Caroline

Participants consider that this could be useful for the beginning of the project to give ideas for the teams to look for when developing the physical tool.

Caroline

Participants consider that this could be useful for the development of the tool if is more detailed for the project, as it could work like a checklist to help evaluate if the team considered all the influences.

Caroline

Participants consider that this could be useful for the development of the tool if is more detailed for the project, as it could work like a checklist to help evaluate if the team considered all the influences and also how the innovation changes those influences or contexts.

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Caroline

is relevant for the participants to see the interactions between elements, it would help in the implementation process but also in the design and exploration of the service.

Caroline

From the perspective of some participants, it would be helpful to have further steps on the connections or what things are important to consider in that specific element, This would be helpful for them to develop or improve the innovation.

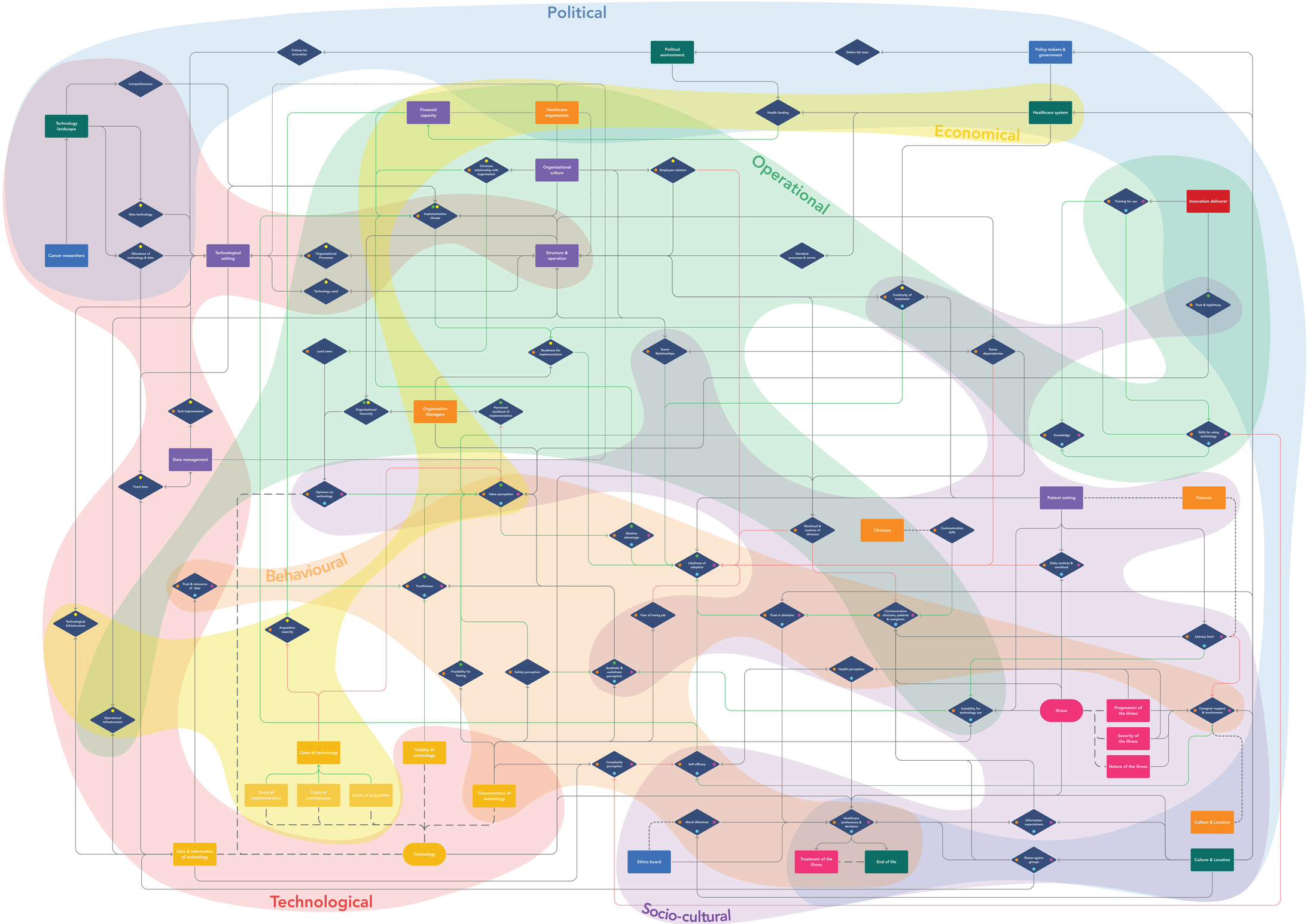
Caroline

From the perspective of some participants, it would be helpful to have further steps on the elements or what things are important to consider in that specific element (Opp), as they might be too open to be actionable.

Caroline

Appendix G

Final map



Carolina Sánchez Villegas
20 of Agust, 2024

Systemic complexity of the cancer care path.

How to read the map:

By elements:
Start reading from any element and follow the connections throughout the map.

By areas:
Choose an area and follow the connections inside it to go through all its elements. Then continue with the other areas.

Legend

Types of elements

- Connection
- Element
- Domain

Domains

- Implementer
- Illness
- External setting
- Organisational setting
- External actors
- Technology
- Adopters

Types of connections

- Undirected relation
- Directed relation
- Mutual relation
- Positive relation
- Negative relation

Adopters in connections

- Organisation managers
- Health organisation
- Caregiver
- Patient
- Clinicians

Appendix H
Project brief

IDE Master Graduation Project

Project team, procedural checks and Personal Project Brief

In this document the agreements made between student and supervisory team about the student's IDE Master Graduation Project are set out. This document may also include involvement of an external client, however does not cover any legal matters student and client (might) agree upon. Next to that, this document facilitates the required procedural checks:

- Student defines the team, what the student is going to do/deliver and how that will come about
- Chair of the supervisory team signs, to formally approve the project's setup / Project brief
- SSC E&SA (Shared Service Centre, Education & Student Affairs) report on the student's registration and study progress
- IDE's Board of Examiners confirms the proposed supervisory team on their eligibility, and whether the student is allowed to start the Graduation Project

STUDENT DATA & MASTER PROGRAMME

Complete all fields and indicate which master(s) you are in

Family name		IDE master(s)	IPD ☐ DfI ☐ SPD ☐
Initials		2nd non-IDE master	
Given name		Individual programme *(date of approval)*	
Student number		Medisign	☐
		HPM	☐

SUPERVISORY TEAM

Fill in he required information of supervisory team members. If applicable, company mentor is added as 2nd mentor

Chair	Dirk Snelders	dept./section	Creative Processes / DOS
mentor	Paula Melo Signerez	dept./section	Creative Processes / DOS
2nd mentor			
client:	Ida Korfage - 4D Picture 4D picture		
city:		country:	
optional comments			

! Ensure a heterogeneous team. In case you wish to include team members from the same section, explain why.

! Chair should request the IDE Board of Examiners for approval when a non-IDE mentor is proposed. Include CV and motivation letter.

! 2nd mentor only applies when a client is involved.

APPROVAL OF CHAIR on PROJECT PROPOSAL / PROJECT BRIEF -> to be filled in **by the Chair** of the supervisory team

Sign for approval (Chair)

Dirk Snelders

Digitally signed by Dirk Snelders
Date: 2024.03.11 11:01:47 +01'00'

Name Dirk Snelders Date 11-03-2024 Signature

CHECK ON STUDY PROGRESS

To be filled in **by SSC E&SA** (Shared Service Centre, Education & Student Affairs), after approval of the project brief by the chair. The study progress will be checked for a 2nd time just before the green light meeting.

Master electives no. of EC accumulated in total _____ EC

Of which, taking conditional requirements into account, can be part of the exam programme _____ EC

★	**YES**	all 1st year master courses passed
	NO	missing 1st year courses

Comments:

Sign for approval (SSC E&SA)

Robin den Braber

Digitaal ondertekend door Robin den Braber
Datum: 2024.03.13 08:24:15 +01'00'

Name Robin den Braber Date 13-03-2024 Signature _____

APPROVAL OF BOARD OF EXAMINERS IDE on SUPERVISORY TEAM -> to be checked and filled in by IDE's Board of Examiners

Does the composition of the Supervisory Team comply with regulations?

YES	★	Supervisory Team approved
NO		Supervisory Team not approved

Comments:

Based on study progress, students is …

★	**ALLOWED** to start the graduation project
	NOT allowed to start the graduation project

Comments:

Sign for approval (BoEx)

Monique von Morgen

Digitally signed by Monique von Morgen
Date: 2024.03.13 09:26:26 +01'00'

Name Monique von Morgen Date 13/3/2024 Signature _____

Personal Project Brief – IDE Master Graduation Project

Name student _____ **Student number** _____

PROJECT TITLE, INTRODUCTION, PROBLEM DEFINITION and ASSIGNMENT

Complete all fields, keep information clear, specific and concise

Project title Designing a Service Design framework for the designers, researchers and developers of 4D Picture to create implementation strategies for the designed Decision support tools.

Please state the title of your graduation project (above). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

Introduction

Describe the context of your project here; What is the domain in which your project takes place? Who are the main stakeholders and what interests are at stake? Describe the opportunities (and limitations) in this domain to better serve the stakeholder interests. (max 250 words)

4D Picture is an international project funded by the European Union in the healthcare domain that aims to enhance the experience of cancer patients during their cancer care journey, by ensuring that their individual health preferences are acknowledged and respected throughout their process. This involves providing support for treatment and care decisions at each phase of the disease, taking into account the needs of patients, families, and healthcare providers (4D Picture, 2024).

To achieve this objective, several tools that facilitate the shared decision-making processes have been created (such as Metro-Mapping and prognostic tools) by a multidisciplinary team of experts, and have been initially implemented in the context of The Netherlands as a pilot for the overall project. As 4D picture is an international project, such tools are expected to be improved and then replicated in other countries across Europe. Therefore, considering the differences in healthcare contexts of the countries, and in order to maintain the tools developed by the project over time; it is crucial for the project designers, developers and researchers to count with engagement from the community to optimise the implementation of such tools.

In this way, involvement of communities in public health innovation becomes essential to assure that the solutions designed by the researchers and development teams of the projects, will be correctly implemented and used (Green & Mercer, 2001). This involvement is seen as a key component of the continuous feedback loop needed to improve person-centred healthcare (Matthews, 2018).

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introduction (continued): space for images

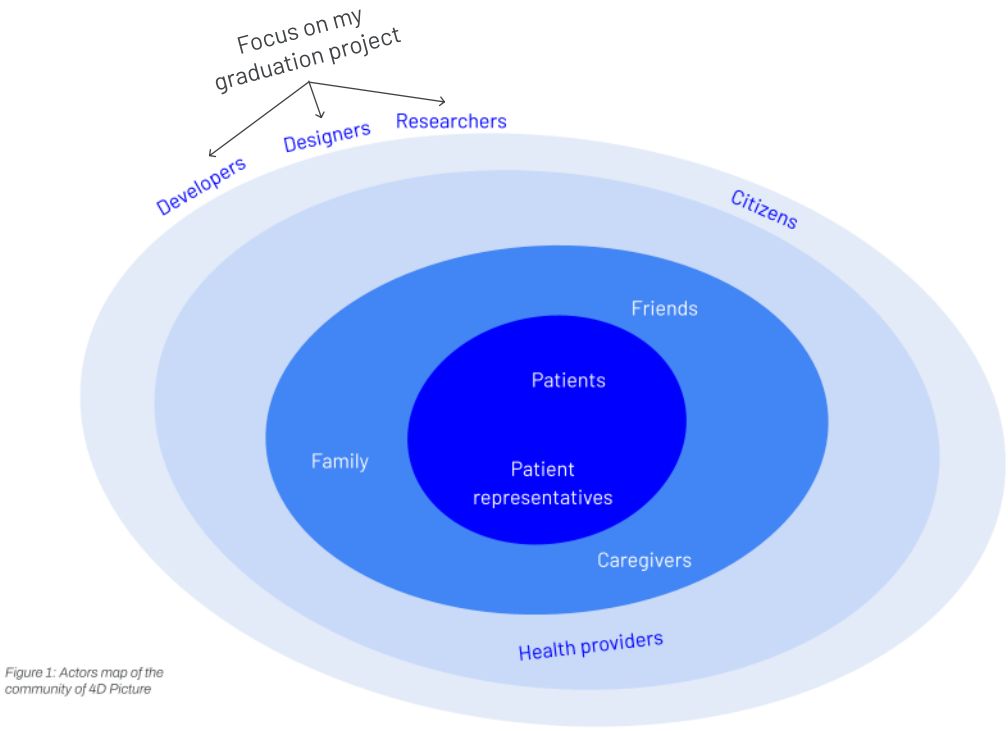


Figure 1: Actors map of the community of 4D Picture

image / figure 1

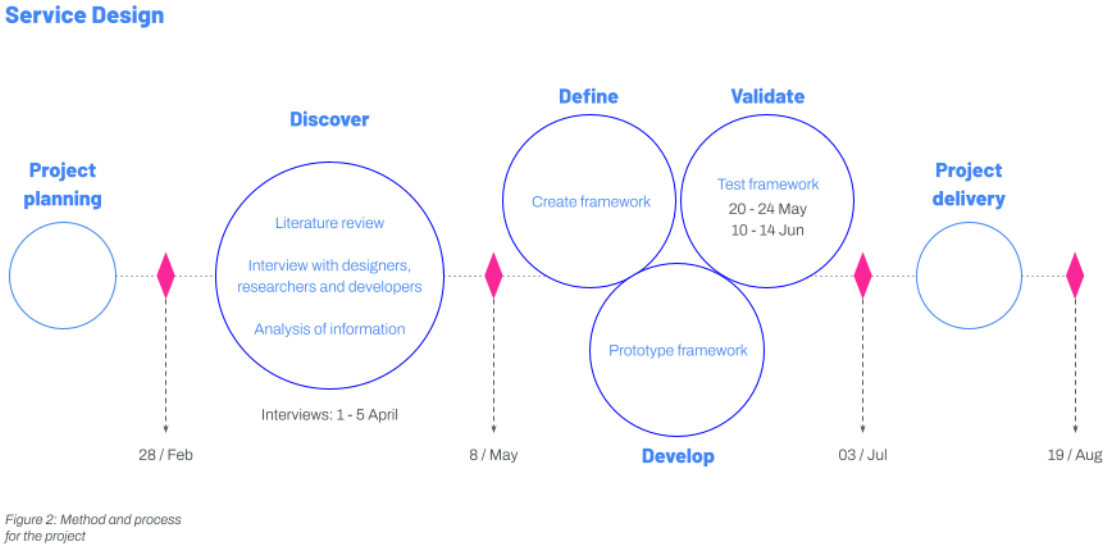


Figure 2: Method and process for the project

image / figure 2

Personal Project Brief – IDE Master Graduation Project

Problem Definition

What problem do you want to solve in the context described in the introduction, and within the available time frame of 100 working days? (= Master Graduation Project of 30 EC). What opportunities do you see to create added value for the described stakeholders? Substantiate your choice.
(max 200 words)

In a Healthcare context as 4D Picture, and in this graduation thesis, the term " community " refers to a group of people with diverse roles in the project; such as patients, patient representatives, family members, caregivers, citizens, designers, researchers, developers and health providers (Figure 1). For this thesis I will focus on a portion of the community: designers, researchers and developers.
Implementing decision support tools for 4D Picture can be a challenge for developers, designers, and researchers due to the diverse interests, functions, and roles of these community members, as well as the varying healthcare contexts across different countries.
Current studies focus on the value of engaging the community in healthcare research (MacQueen et al., 2001; Green & Mercer, 2001; Matthews et al., 2018), and the challenges and enablers to achieve this engagement (De Weger et al., 2018). However, there is no body of literature (found by the author) that provides a guideline for healthcare designers on how they can orchestrate the communities for an optimal implementation of health innovations. This lack of knowledge creates a challenge:

How can Designers, developers and researchers of 4D Picture, create implementation strategies for the designed decision support tools in health-related contexts that allows them to engage the community in the implementation process?

Assignment

This is the most important part of the project brief because it will give a clear direction of what you are heading for. Formulate an assignment to yourself regarding what you expect to deliver as result at the end of your project. (1 sentence) As you graduate as an industrial design engineer, your assignment will start with a verb (Design/Investigate/Validate/Create), and you may use the green text format:

Design a Service Design framework that enables designers, developers and researchers of 4D Picture to create implementation strategies for the designed decision support tools in health-related contexts and allows them to engage the community in the implementation process.

Then explain your project approach to carrying out your graduation project and what research and design methods you plan to use to generate your design solution (max 150 words)

I will use Service Design tools and methods to guide my design process for the creation of the framework that will guide designers on how to create the strategies for implementation of a decision support tool in a health context. In this graduation project I will focus on the phases of the SD process: Discover, Define, Develop and Validate (Figure 2).

Discover: Interview with researchers, developers and designers and Literature review of community engagement methods in healthcare and other in other contexts.
Define: Create the framework
Develop: Prototype the framework.
Validate: Validate the framework with researchers, developers and designers

To see the project plan please go to Annex 1.

Project planning and key moments

To make visible how you plan to spend your time, you must make a planning for the full project. You are advised to use a Gantt chart format to show the different phases of your project, deliverables you have in mind, meetings and in-between deadlines. Keep in mind that all activities should fit within the given run time of 100 working days. Your planning should include a ***kick-off meeting, mid-term evaluation meeting, green light meeting*** *and* ***graduation ceremony****. Please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any (for instance because of holidays or parallel course activities).*

Make sure to attach the full plan to this project brief.
The four key moment dates must be filled in below

Kick off meeting	28 of February
Mid-term evaluation	8th of May
Green light meeting	3rd of July
Graduation ceremony	19th of Agust

In exceptional cases (part of) the Graduation Project may need to be scheduled part-time. Indicate here if such applies to your project

Part of project scheduled part-time	✔
For how many project weeks	9
Number of project days per week	4

Comments:
Working two days a week on my internship until 16th of April, therefore i ' ll work 3 days on the graduation project

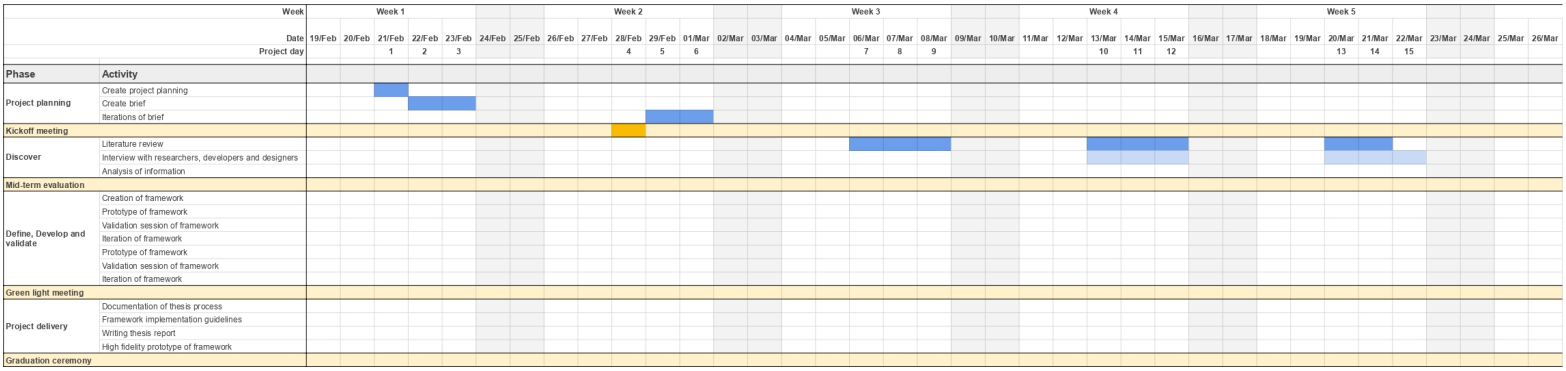
Motivation and personal ambitions

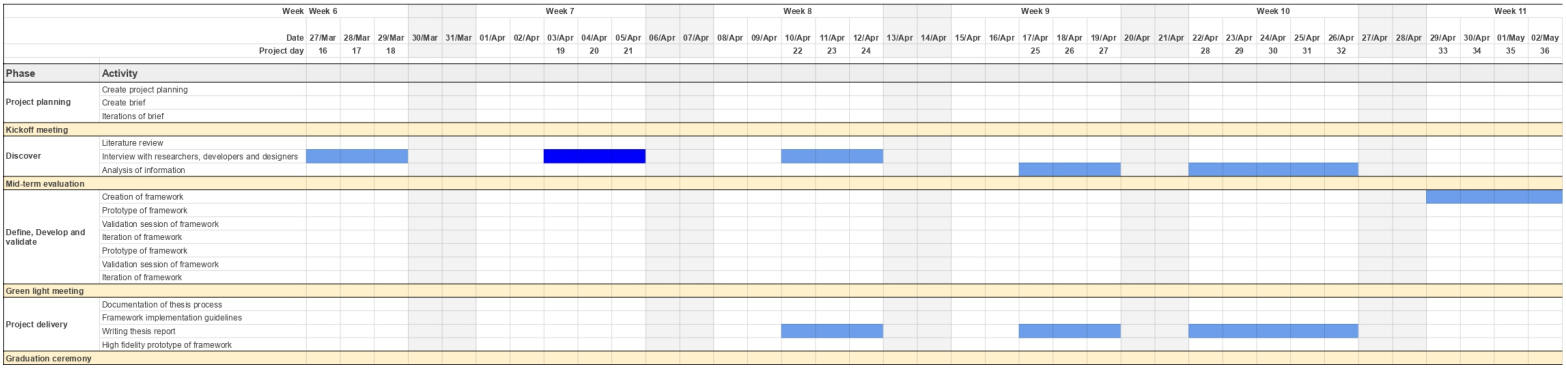
Explain why you wish to start this project, what competencies you want to prove or develop (e.g. competencies acquired in your MSc programme, electives, extra-curricular activities or other).

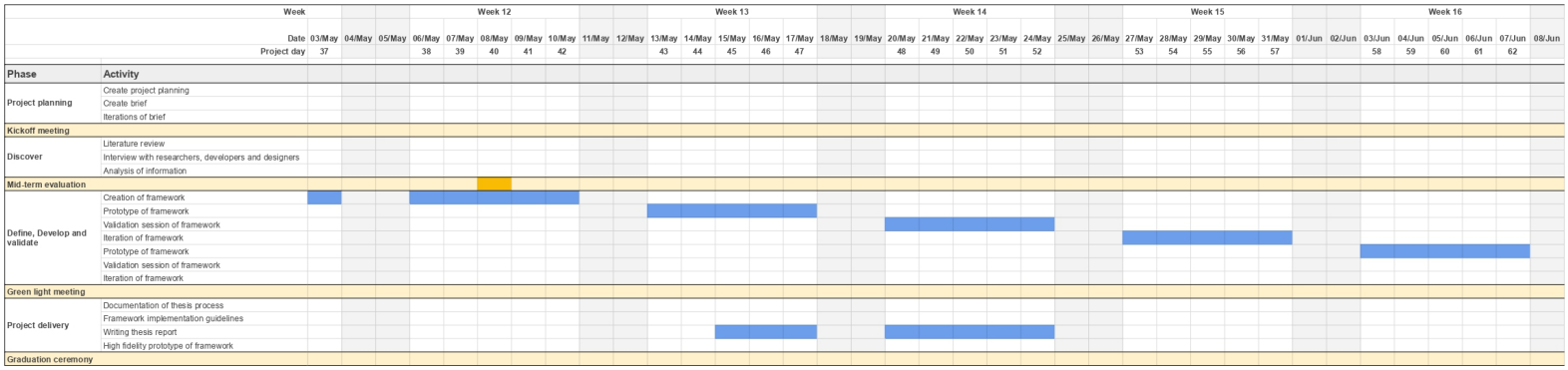
Optionally, describe whether you have some personal learning ambitions which you explicitly want to address in this project, on top of the learning objectives of the Graduation Project itself. You might think of e.g. acquiring in depth knowledge on a specific subject, broadening your competencies or experimenting with a specific tool or methodology. Personal learning ambitions are limited to a maximum number of five.
(200 words max)

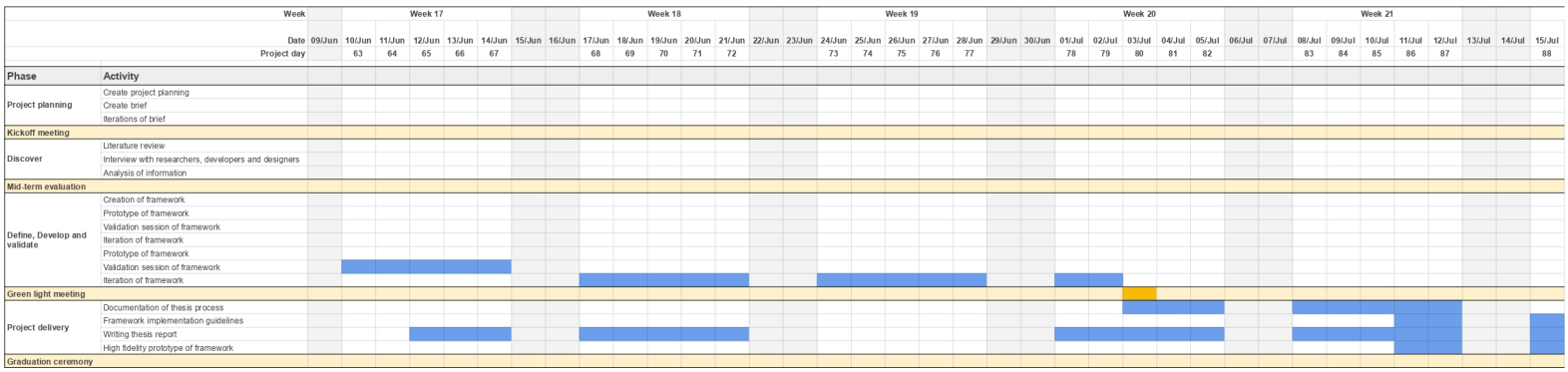
My motivation to work on this project is the curiosity on possible intersections of design and healthcare, and the possibilities of enhancing healthcare experiences through innovative design solutions that can not only help improve the lives of people but also the lives of health professionals.
Additionally, I want to apply the knowledge gained during my masters program, specially about Service design and strategy, and apply learned methods and tools relevant for the creation of Design Framework, for example during the interviews and validation of the framework. Besides the hard skills on specific design tools, I also want to put in practice soft skills on Project management that are needed to carry out this project in a successful way.
Healthcare is a fundamental service that impacts everyone, and I believe there is opportunity for transformation. Through this project, I aspire to not only expand my knowledge but also contribute to the design knowledge in healthcare and to help build the enhancement of patients' cancer care journey.

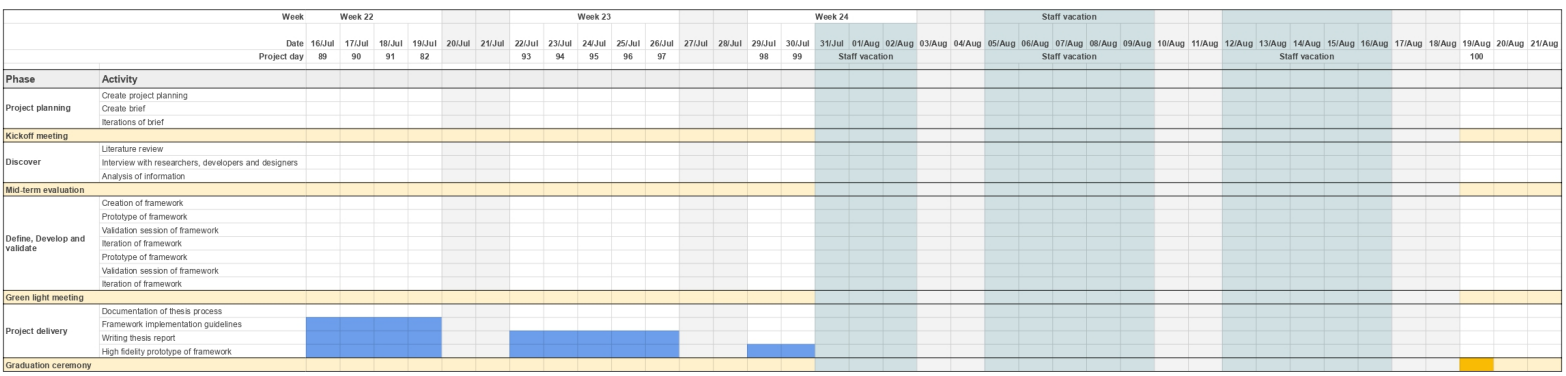
Annex 1 - Graduation project Gantt











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