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<i>Design strategies for future sustainable implementation: overcoming barriers, finding strategies to spread the use of the tools, develop them in other facilities.</i>
This deliverable presents a design strategy from a ' <b>Design Thinking</b> ' perspective.

# DESIGN STRATEGIES FOR FUTURE SUSTAINABLE IMPLEMENTATION [DESIGN THINKING]:



**OVERCOMING BARRIERS,  
FINDING STRATEGIES TO  
SPREAD THE USE OF THE  
TOOLS AND DEVELOP THEM  
IN OTHER FACILITIES**

## Abstract

The following is a short guide in helping future start-ups and projects in the mental health technology field consider design strategies for future sustainable implementation. Discussed are lessons learned from the IT4 Anxiety Interreg project 2019-23.

**Interreg**   
North-West Europe  
**IT4ANXIETY**

European Regional Development Fund

# Table Of Contents

About	03
Aims of this guide	03
Need for sustainable design strategies for Mental Health Technologies	03
Current barriers	04
Considerations for Overcoming barriers	06
1. Overcoming Barriers	06
2. Spreading Use of Technologies	08
3. Developing Technologies in Other Facilities	09
Conclusion	10
Design strategies: Design thinking	11
Design thinking overview	12
Key principles of design thinking	13
Guide: How to implement design thinking	14
Building for sustainability: overcoming challenges with design thinking	16
Design thinking within IT4Anxiety	17
Challenges and barriers identified	18
Overcoming barriers with design thinking	22
References	24

## About

IT4Anxiety is an inter-regional project aimed at reducing anxiety in patients with mental disorders through the implementation of innovative solutions developed by start-ups. The project's objective is to co-create and implement 10 validated solutions that address the needs of approximately 3000 patients facing anxiety disorders. Additionally, the involvement of 15 start-ups is expected to contribute to the creation of around 50 new jobs. The project also aims to provide training systems that benefit nearly a thousand mental health professionals.

## Aims of this guide

This guide seeks to share valuable insights gained from the IT4Anxiety project to assist start-ups in their design process and enhance their sustainability in the market. By providing an overview of the current landscape of challenges and barriers in the design of Mental Health technologies, as well as insights from start-ups in the sector, this guide aims to offer valuable information for the development of effective design strategies for the future sustainable implementation of mental health technologies.

## Need for sustainable design strategies for Mental Health Technologies

The economic impact of mental health problems is substantial, with significant costs associated with their prevalence. According to the World Economic Forum (2023), the global cost of mental health problems was estimated to be £1.9 trillion in 2010, and this figure is projected to rise to £4.6 trillion by 2030. A significant portion of these societal costs, approximately two-thirds, can be attributed to factors such as reduced economic productivity, increased unemployment rates, and diminished job performance. Individually, the costs manifest through decreased productivity among individuals with mental health issues and their caregivers, as well as the often-overwhelming out-of-pocket expenses incurred for healthcare services.

The link between poverty and mental health problems is complex, forming a cyclical relationship where poverty increases the likelihood of developing mental health issues, while mental health problems exacerbate economic disadvantages. This correlation is particularly pronounced in lower-income countries, where the

absence of social welfare safety nets and limited access to effective treatments intensify the cycle of disadvantage. Breaking this destructive cycle requires addressing both the underlying causes and consequences of mental health problems, thereby establishing a foundation for sustainable development across all regions of the world.

In the context of mental health technology, sustainable design encompasses considering the environmental, social, and economic impacts of products and services throughout their entire lifecycle, from initial development to end-of-life disposal. EcoDesign, a crucial tool in the array of approaches, plays a vital role in enabling the Circular Economy.

It is imperative for national governments and international donors to prioritise investment in mental health by incorporating specific targets for mental health within the Health Goal of the Sustainable Development Goals (SDGs). The United Nations recognised mental health as a global development priority in 2016, with an objective to reduce premature mortality from non-communicable diseases by one third by 2030. As we approach 2023, a critical halfway point towards the SDGs outlined by the United Nations, it is an opportune time to put into practice the lessons learned from the COVID-19 pandemic. The pandemic placed unprecedented strain on healthcare systems worldwide and highlighted the significance of global health, demonstrating that strong health systems can safeguard nations and economies. Concerted and collective action is needed to make progress towards achieving SDG 3, which aims to **“Ensure healthy lives and promote well-being for all at all ages,”** leaving no one behind.

Establishing robust and collaborative global research partnerships within the UK and Ireland that leverage technical, scientific, and clinical expertise will facilitate the development of more accessible and affordable mental health technologies. Two major objectives within the SDG goals for the upcoming years are to advance leadership in science and technology, strengthening the global health research base of the UK and partner countries while supporting trade and investment, and to influence the international discourse on the future of global health institutions and initiatives, utilising strategic partnerships to secure new commitments for reform, including promoting equitable and affordable access to new technologies.

**To effectively design sustainable strategies for the development of mental health technology, it is crucial to first identify the challenges and barriers and subsequently overcome them.**



# Current barriers

Implementation science is an emerging and rapidly expanding field that encompasses theories, frameworks, methods, and strategies to promote the adoption and long-term viability of innovations in real-world settings. In the specific context of Digital Mental Health Interventions (DMHIs), notable advancements have been made in identifying factors that facilitate or impede their implementation, as evidenced by various sources (refer to Table 1).



Additionally, frameworks such as the Non-adoption, Abandonment, Scale-up, Spread, and Sustainability (NASSS) framework introduced by Greenhalgh et al. (2017) have been established to predict and assess the success of patient-facing healthcare technologies. Implementation outcomes in the DMHI field have also been defined.

Hermes, Lyon, Schueller, & Glass, 2019.

However, despite these advancements, there exists a gap in understanding the specific methods and techniques, referred to as “**implementation strategies**” by Powell et al. (2012) and Powell et al. (2015), for effectively implementing DMHIs within healthcare settings. The adoption of evidence-based services necessitates an evidence-based approach to implementation. Implementation strategies offer practical and replicable techniques that guide the implementation process, and their effectiveness is supported by a growing body of evidence (Cochrane Collaboration, 2013; Powell et al., 2019). However, the literature lacks a comprehensive set of implementation strategies specifically tailored for DMHIs in healthcare settings, with only a limited number of proposals and fewer still having undergone testing and dissemination (Graham et al., 2020).

Considering that doctors, psychologists and other therapists often play a crucial role in managing the implementation of new mental health technologies, it is essential to equip them with effective strategies to guide DMHI implementation. While the extent of DMHI usage may vary among psychologists depending on their patient population and practice characteristics, understanding the scope of their work is valuable in supporting this process. It is important that start-up companies in the mental health tech sector are aware of the barriers concerning the implementation of technologies in a clinical setting as well as during the design process of the technology.

**Table 1.** Summary of common barriers to implementation of mental health care technologies.

Individual barriers	Organizational barriers
Stigma associated with mental health and help seeking	Organisational barriers (e.g. scheduling problems)
Preference for traditional delivery of face-to-face care	No available technology support
Concerns with confidentiality, privacy & data breaches	Limited staff resources and staff turn-over
Discomfort with or feeling incapable of using technology	Lack of cultural and ethnic diversity
Complexity of the technology or intervention	Financial costs (e.g. reimbursement, startup costs)
Mobile compatibility issues & interoperability with other systems	Practitioners negative attitudes toward DMHIs
Low digital literacy or awareness of DMHIs	Practitioners resistance to change
Limited research evidence for the DMHI	Practitioners perceived negative impact on consumer safety
Nonadherence & attrition	

**Table 1** provides a comprehensive overview of the common barriers to the implementation of mental health care technologies. The barriers are categorized into two groups: individual barriers and organizational barriers.

## Individual barriers

Individual barriers refer to those encountered at the personal level, including stigma related to mental health, preference for traditional face-to-face care, confidentiality concerns, discomfort or lack of capability in using technology, complexity of the technology, mobile compatibility issues, low digital literacy, limited research evidence for DMHIs, and nonadherence & attrition.

## Organizational barriers

Organizational barriers are challenges that exist within the broader systems or institutions, such as organizational issues like scheduling problems, lack of available technology support, limited staff resources, staff turnover, financial costs associated with adoption, practitioners’ negative attitudes toward DMHIs, resistance to change, and concerns regarding the perceived negative impact on consumer safety.

**Table 1** highlights the complexities involved in the implementation of DMHIs. Both individual and organizational barriers present substantial obstacles that need to be addressed for successful and sustainable DMHI adoption. Overcoming the above barriers require many considerations which will be explored in the subsequent section.



# Considerations for overcoming barriers

Digital technologies hold great promise for advancing mental healthcare delivery and improving outcomes. However, the successful implementation and widespread adoption of mental health technologies face significant barriers.

This literature review aims to explore design strategies that can overcome these barriers and promote the sustainable implementation of mental health technologies. Specifically, we will examine strategies to overcome common barriers highlighted in Table 1, spread the use of technologies, and facilitate their development in diverse facilities.

## 1

### 1. Overcoming Barriers:

#### 1.1 User-centred design:

Research has indicated that many individuals are willing to adopt new technologies to improve their mental health (Dragovic et al., 2018). However, user attrition is a common issue in mental health studies involving technology, with users often dropping out or ceasing technology usage before completing a study. For instance, a study of 93 mobile mental health apps found low overall user retention, with only a 3.9% retention rate at 15 days and a 3.3% retention rate at 30 days (Baumel et al., 2019). Motivating users to start using e-mental health solutions for the first time has also proven challenging (Eccles et al., 2020). To address these challenges, a user-centered design approach has gained prominence in the development of mental health technologies. By involving end-users and mental health professionals throughout the design process, technologies can be tailored to their specific needs, preferences, and contextual factors (Vial et al., 2018).

This approach ensures that the technologies are usable, acceptable, and meet the unique requirements of the target population. It is important to note that design should not be confused with engineering design, as engineers and designers have different approaches to technology design (Roozenburg and Cross, 1996). Engineers often focus on technical functioning and specific goals, while designers creatively explore the design space for novel possibilities. In healthcare, designers pay attention to unmet needs and ways to improve care, using user-centered practices (Vial et al., 2018). Various human-centered design approaches, such as user-centered design, user experience design, design thinking, participatory design, and co-design, allow end users to significantly influence the design of technologies (Vial et al., 2022).

#### 1.2 Accessibility:

As previously mentioned, individuals in developing countries and socio-economically deprived communities are more susceptible to mental health problems. Enhancing the accessibility of mental health technologies involves considering multiple factors. Technologies should be designed to accommodate individuals with diverse abilities, languages, and literacy levels, as well as ensuring accessibility in socio-economically deprived areas (Bunyi et al., 2021). This is crucial for promoting equitable and inclusive implementation. Incorporating features such as multilingual interfaces, text-to-speech capabilities, and intuitive navigation can improve accessibility and expand the reach of these technologies. Additionally, the technology should be intuitively easy to use for individuals with lower levels of education.

#### 1.3 Privacy and security:

Privacy and security concerns have been identified as significant barriers to the adoption of mental health technologies (Lustgarten et al., 2020). Designing technologies with robust data encryption, informed consent mechanisms, and transparent data handling practices can address these concerns. By prioritizing privacy and security, technologies can instill trust and compliance with data protection regulations (Montagni et al., 2020).





# 2

## 2. Spreading Use of Technologies:

### 2.1 Education and awareness:

Increasing public and professional awareness about mental health technologies is crucial for their widespread adoption. Educational initiatives, such as workshops, webinars, and training programs, can promote understanding of the benefits and effective utilisation of these technologies (Hollis et al., 2019). Collaborating with mental health organisations, universities, and healthcare providers in disseminating knowledge can facilitate the integration of technologies into routine clinical practice.

### 2.2 Integration in clinical settings:

The successful integration of mental health technologies into clinical settings is vital for their utilisation. Seamless integration with electronic health records (EHRs) and telehealth platforms can facilitate communication, data sharing, and collaboration between healthcare professionals and patients (Torous et al., 2020). Integrating technologies into existing clinical workflows ensures that they become an integral part of routine care delivery.

### 2.3 Collaborative partnerships:

Collaborative partnerships with stakeholders, including insurance providers, employers, and community organisations, can play a pivotal role in spreading the use of mental health technologies. These partnerships can address barriers related to funding, reimbursement, and infrastructural support (Mishkind et al., 2021). By aligning interests and pooling resources, collaborative initiatives can enhance access, reduce costs, and establish support structures for sustainable implementation.



# 3

## 3. Developing Technologies in Other Facilities:

### 3.1 Scalability and adaptability:

Designing mental health technologies with scalability and adaptability in mind enables their implementation in diverse facilities and settings. Considering factors such as resource availability, infrastructure constraints, and cultural considerations ensures that technologies can be effectively deployed across different contexts (Eyles et al., 2018). Scalable and adaptable technologies can accommodate variations in needs and resources, thereby promoting their wider adoption.

### 3.2 Co-creation with local stakeholders:

Engaging local mental health professionals, communities, and policymakers in the development process is essential for the successful implementation of technologies in other facilities. Co-creation approaches foster cultural relevance and ownership, ensuring that technologies align with the specific needs and resources of different regions (Langan et al., 2020). Collaborative partnerships between technology developers and local stakeholders facilitate the customization and contextualization of technologies.

### 3.3 Knowledge sharing & capacity building:

Establishing mechanisms for knowledge sharing and capacity building among facilities can support the development and implementation of mental health technologies. Collaborative platforms, training programs, and research networks can facilitate the exchange of best practices, challenges, and innovative solutions (Mishkind et al., 2021). These initiatives enable facilities to learn from each other's experiences and foster a culture of continuous improvement.





## Conclusion

**Effective design strategies are crucial for sustainable implementation of mental health technologies. User-centered design involves involving end-users and mental health professionals throughout the design process to meet their specific needs.**

Accessibility features such as multilingual interfaces and intuitive navigation enhance usability. Privacy measures like data encryption address security concerns. Education and awareness initiatives increase adoption. Integration with electronic health records and telehealth platforms facilitates seamless use in clinical settings. Collaborative partnerships with stakeholders overcome funding and support barriers. Scalability and adaptability ensure deployment in diverse facilities. Engaging local stakeholders fosters cultural relevance. Knowledge sharing and capacity building enable continuous improvement.

These strategies promote widespread adoption and improved mental health outcomes. Insights from projects like the IT4Anxiety inter-reg project can guide start-ups in design strategies for future sustainable implementation of their technologies.



# Design strategies: Design thinking

# Principles

## Design thinking overview

Design thinking is a human-centred and iterative approach to problem-solving and innovation. It puts people at the core of the design process, emphasizing empathy and understanding their needs, desires, and experiences. By adopting a creative and collaborative mindset, design thinkers aim to uncover unique insights and generate innovative solutions. Design thinking involves multiple cycles of ideation, prototyping, and testing, allowing for continuous refinement and improvement. This approach encourages interdisciplinary collaboration, embraces ambiguity, and values user feedback throughout the design journey. Design thinking fosters a culture of curiosity, experimentation, and learning, ultimately leading to the creation of products, services, and experiences that truly resonate with users.

## Key principles of design thinking

Design thinking is a human-centred approach to problem-solving that emphasizes creativity, empathy, and collaboration. It involves a set of key principles that guide the process. These principles collectively guide the design thinking process and help foster a user-centred, iterative, and innovative approach to problem-solving.



Here are the main principles of design thinking:

### 1. Human-Centred

Design thinking puts the needs, desires, and experiences of people at the centre of the design process. It involves understanding and empathizing with users to uncover their underlying needs and motivations.

### 2. Empathy

Empathy is a fundamental aspect of design thinking. It involves actively listening to and understanding the perspectives, emotions, and behaviours of the people for whom you are designing. By empathizing with users, designers gain insights that inform the design process.

### 3. Iterative Process

Design thinking is an iterative approach that involves multiple cycles of ideation, prototyping, and testing. It encourages a willingness to explore, experiment, and refine ideas based on feedback and learning from each iteration.

### 4. Collaboration

Design thinking promotes interdisciplinary collaboration and teamwork. It brings together individuals with diverse backgrounds and expertise to foster creativity and generate a wide range of ideas. Collaboration helps to create holistic and innovative solutions.

### 5. Creative Problem-Solving

Design thinking encourages an open and creative mindset. It involves exploring unconventional ideas and challenging assumptions to uncover new possibilities. Designers often use techniques such as brainstorming and ideation to generate a broad range of solutions.

### 6. Prototyping

Prototyping is a core component of design thinking. It involves creating tangible representations of ideas, whether in the form of sketches, physical models, or digital mock-ups. Prototypes allow designers to quickly test and gather feedback on their ideas before investing significant resources.

### 7. Bias Towards Action

Design thinking emphasizes taking action and learning through doing. Rather than relying solely on theoretical or analytical approaches, designers actively engage in experimentation and implementation to gain real-world insights and validate assumptions.

### 8. Embracing Ambiguity

Design thinking acknowledges that complex problems often lack clear solutions. Designers embrace ambiguity and navigate uncertainty by reframing problems, asking insightful questions, and exploring multiple perspectives to uncover innovative solutions.

### 9. User Feedback

Design thinking emphasizes the importance of gathering feedback from users throughout the design process. By involving users early and often, designers can validate assumptions, refine ideas, and ensure that the final solution meets users' needs effectively.

### 10. Continuous Learning

Design thinking encourages a culture of continuous learning and improvement. Designers reflect on their experiences, learn from failures and successes, and apply these insights to future design challenges.



# Guide: How to implement design thinking

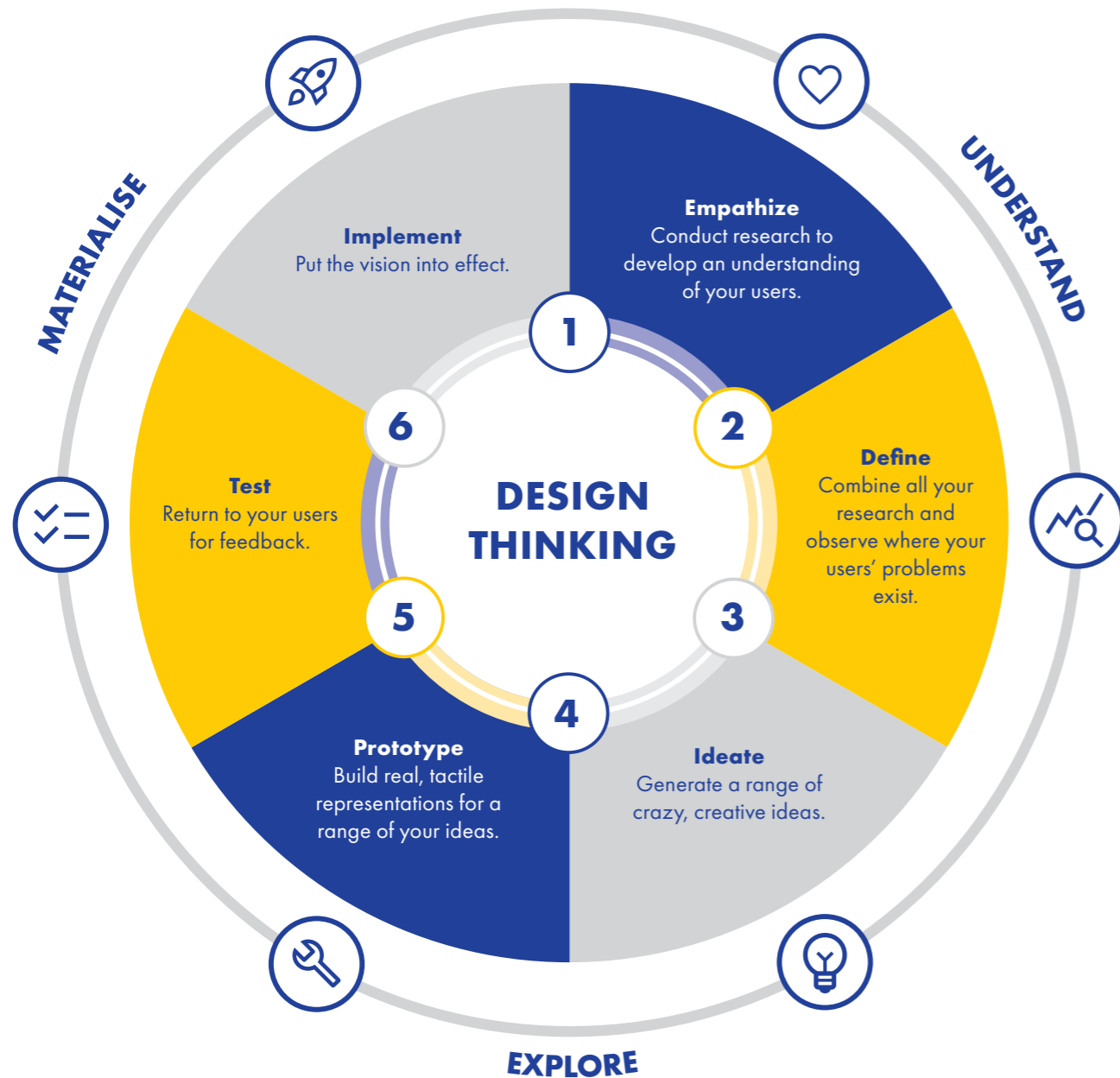


Figure 1. Design thinking iterative framework

Implementing design thinking for an e-mental health startup involves a systematic and iterative process. Here's a step-by-step guide to help you get started:

## 1. Understand the Target Audience:

- ▶ Identify the specific target audience for your e-mental health startup, such as individuals with anxiety or depression.
- ▶ Conduct research and gather insights about their needs, challenges, and preferences.
- ▶ Use methods like interviews, surveys, and observations to develop empathy and gain a deep understanding of their experiences.

## 2. Define the Problem:

- ▶ Based on your research, define the specific problem or challenge that your e-mental health startup aims to address.
- ▶ Clearly articulate the problem statement, ensuring it is focused, actionable, and aligns with the needs of your target audience.
- ▶ Consider factors such as accessibility, affordability, and user experience when defining the problem.

## 3. Ideation and Solution Generation:

- ▶ Conduct brainstorming sessions with your team to generate a wide range of ideas and potential solutions.
- ▶ Encourage a free flow of ideas without judgment, and build upon each other's suggestions.
- ▶ Utilize techniques like mind mapping, storyboarding, or concept sketching to visualize and explore potential solutions.

## 4. Prioritize and Refine Ideas:

- ▶ Evaluate and prioritize the generated ideas based on their feasibility, impact, and alignment with your startup's vision.
- ▶ Use methods like voting, scoring, or affinity mapping to determine which ideas to pursue further.
- ▶ Refine the selected ideas, combining and iterating on them to create a more comprehensive solution concept.

## 5. Prototyping:

- ▶ Create prototypes of your solution concepts, focusing on the core functionalities and user interactions.
- ▶ Prototypes can take various forms, such as wireframes, mock-ups, or interactive digital prototypes.
- ▶ Aim for low-fidelity prototypes initially, as they are quick and cost-effective to iterate on.

## 6. Test and Gather Feedback:

- ▶ Conduct user testing sessions to gather feedback on your prototypes.
- ▶ Observe and interview users as they interact with the prototypes, and encourage them to share their thoughts, feelings, and suggestions.
- ▶ Use the feedback to identify strengths, weaknesses, and areas for improvement in your solution.

## 7. Iterate and Refine:

- ▶ Based on the feedback, analyse the insights and identify necessary changes or enhancements to your solution.
- ▶ Iteratively refine and iterate on your prototype, incorporating user feedback and making necessary adjustments.
- ▶ Repeat the testing and refinement process until you achieve a solution that effectively addresses the problem and meets user needs.

## 8. Implement and Launch:

- ▶ Develop a plan for implementing and launching your e-mental health solution.
- ▶ Consider technical requirements, resource allocation, and regulatory considerations.
- ▶ Collaborate with your team to ensure smooth execution and a successful launch.

## 9. Continuously Learn and Improve:

- ▶ Once your solution is launched, collect feedback and data from users to evaluate its effectiveness.
- ▶ Continuously monitor and assess user satisfaction, engagement, and outcomes.
- ▶ Use this information to make data-driven decisions for further improvements and enhancements to your e-mental health startup.

**Remember, design thinking is an iterative process, and these steps may overlap or be revisited as you gain new insights and learn from user feedback. Stay open to experimentation, collaboration, and a user-centred mindset throughout the entire journey.**



# Building for sustainability: overcoming challenges with **design** thinking

**Design thinking can be a powerful approach to overcome barriers and enable sustainable product development for an e-mental health startup. By applying design thinking principles, such as empathy, collaboration, and iteration, the startup can address various challenges. For example, design thinking helps the team understand the complex needs and experiences of users, allowing them to create solutions that truly resonate.**

Through interdisciplinary collaboration, the startup can leverage diverse perspectives to generate innovative ideas and holistic solutions. The iterative nature of design thinking enables continuous improvement, allowing the startup to refine their product based on user feedback and evolving requirements.

Design thinking also promotes a user-centred approach, ensuring that the e-mental health solution remains relevant, accessible, and effective in supporting mental well-being while considering sustainability factors such as long-term impact, scalability, and ethical considerations.

Overall, design thinking empowers the e-mental health startup to create sustainable products that address barriers, enhance user experience, and have a positive impact on mental health.



## Design thinking within IT4Anxiety Startups

As part of IT4Anxiety activities, a series of six focus groups were conducted to learn more about the startups' product development and testing journey. Eighteen startups took part in at least one focus group; transcripts from the focus were analysed to provide insights on how they approached sustainable development and implementation.

Based on the provided focus group transcripts, there were indications of design thinking elements discussed by the startups. Design thinking is an iterative approach to problem-solving that involves empathizing with users, defining their needs, ideating potential solutions, prototyping, and testing. While the discussions did not explicitly mention the term "design thinking," certain aspects aligned with its principles.

For example, the startups emphasized the importance of user feedback and testing to ensure their products met user needs. They mentioned conducting interviews, gathering feedback through questionnaires, and testing prototypes with user groups, such as therapists, elderly home residents, and individuals suffering from dementia. This user-centric approach demonstrates the consideration of user perspectives and their experiences in the design and development process.

Additionally, the startups acknowledged the challenge of developing user-friendly interfaces for diverse user groups with varying skills and preferences. They mentioned iterative improvements, continuous adaptation, and the need to address the user interface (UI) and user experience (UX) design to make their products more accessible and usable. This reflects a focus on understanding user requirements and designing solutions that meet their needs effectively.

While the discussions did not delve deeply into the specific stages or methods of design thinking, the startups showcased elements of empathy, user feedback, iteration, and an iterative approach to problem-solving. These align with the core principles of design thinking, indicating a consideration for user-centred design and a willingness to adapt and iterate based on user feedback.

# Challenges and barriers identified

The focus groups conducted revealed several common themes and challenges encountered in product development. These discussions involved participants sharing their experiences and insights regarding various aspects of their projects. By aggregating the frequency tables generated from the focus groups, we can identify key themes that emerged consistently across multiple discussions. These themes shed light on the challenges faced by the participants and provide valuable insights for navigating the complexities of product development.



## Summary of Themes:

### 01

#### Resource Constraints

A prominent theme was the limitation of resources, including financial, human, and technological resources. Participants expressed the challenge of balancing their product development goals with limited available resources, such as funding, staffing, and technology infrastructure.

### 02

#### User Interface (UI) and User Experience (UX)

The importance of designing user-friendly interfaces that meet the diverse needs of the target user groups was emphasized. Participants highlighted the need to ensure intuitive and accessible interfaces for users, particularly those with limited digital literacy or specific cognitive abilities.

### 03

#### Compliance with Standards & Regulations

The focus groups revealed the challenges associated with conforming to EU compliance standards, including GDPR and CE regulations. Participants discussed the complexity and costs associated with ensuring regulatory compliance while developing their technologies.

### 04

#### Legacy Systems

Participants discussed the difficulties of building upon existing frameworks or outdated technologies. They highlighted the challenges of integrating new features and maintaining compatibility with legacy systems, which often required extensive adaptations and posed technical hurdles.

### 05

#### User Feedback and Testing

The importance of obtaining user feedback throughout the development process was emphasized. Participants shared their strategies for collecting feedback, such as conducting interviews, usability questionnaires, and prototype testing, to validate their technology and ensure it met user needs.

### 06

#### Business Operations and Funding

Participants discussed the challenges of managing business activities, including securing funding and ensuring running costs while focusing on product development. Strategies to minimize risks and optimize time allocation were explored to maintain progress amid financial constraints.



# Issues & Challenges

These themes provide valuable insights into the complexities and considerations involved in product development. By understanding these challenges, developers and organizations can better prepare and strategize for successful product development initiatives. Based on the tables generated from the various focus groups, the following is an aggregated frequency table of the issues/challenges discussed:







This frequency table provides an overview of the most commonly discussed issues and challenges across all focus groups, highlighting the recurring themes and areas of concern.

Based on this analysis, it is evident that resource constraints and user feedback/testing were the most frequently discussed challenges, with 15 and 13 occurrences, respectively. User interface (UI) and user experience (UX) were also highlighted as significant considerations, with 12 occurrences. Compliance with standards and regulations, legacy systems, and business operations and funding were discussed relatively less frequently, but still remain important factors to address during product development.

Overall, the focus groups revealed consistent themes and challenges in product development, with resource constraints, user interface/experience, and user feedback/testing emerging as key areas of focus. These findings emphasize the need for careful resource allocation, user-centric design, and iterative feedback loops to ensure the successful development of products that meet user needs while complying with regulations and operating within limited resources. By addressing these challenges effectively, organizations can enhance their product development strategies and increase the likelihood of successful outcomes.

**Table 5:** Aggregated frequency table

Issue/Challenge	Frequency
Resource constraints	5
User interface (UI) and user experience (UX)	4
Compliance with standards and regulations	3
Legacy systems	2
User feedback	2
Business operations and funding	2
Accessing the user group	2
Medical/therapeutic expertise	2
Decision-making and feature prioritization	1
Data protection and data safety	1
Availability of user resources	1
User-friendliness	1
Going to market	1
Technology conformity	1
Running costs	1
Time management	1

Issue/Challenge	Occurrence
 <b>01</b> Resource Constraints	<b>15</b>
 <b>02</b> User Interface (UI) and User Experience (UX)	<b>12</b>
 <b>03</b> Compliance with Standards and Regulations	<b>10</b>
 <b>04</b> Legacy Systems	<b>8</b>
 <b>05</b> User Feedback and Testing	<b>13</b>
 <b>06</b> Business Operations and Funding	<b>9</b>

# Overcoming barriers with design thinking

Design thinking can be applied to overcome the challenges identified in the text by adopting the following approaches:

## 1 Resource Constraints:

Design thinking encourages creative problem-solving and resource optimization. Start by reframing the problem and exploring alternative ways to achieve the desired outcomes within the available resources. Engage in collaborative brainstorming sessions to generate innovative ideas and consider partnerships or collaborations to leverage additional resources.

## 2 User Interface (UI) & User Experience (UX):

Design thinking prioritizes user-centered design. Conduct user research and usability testing to gain insights into the diverse needs of the target user groups. Create low-fidelity prototypes and gather user feedback iteratively to refine the UI/UX. Involve users in co-design sessions to ensure intuitive and accessible interfaces.

## 3 Compliance with Standards & Regulations:

Design thinking emphasizes empathy and understanding user needs, which includes considering regulatory requirements. Collaborate with legal experts or consultants who specialize in compliance to understand and navigate the complex regulations. Iteratively design and test solutions to ensure compliance without sacrificing usability or functionality.

## 4 Legacy Systems:

Adopt a user-centred approach when dealing with legacy systems. Conduct user research to understand the pain points and challenges associated with the integration of new features. Prototype and test solutions that address compatibility issues, ensuring a seamless user experience while maintaining functionality with legacy systems.

## 5 User Feedback and Testing:

Design thinking incorporates user feedback throughout the development process. Implement a user feedback loop by conducting interviews, usability questionnaires, and prototype testing. Actively involve users in co-creation and evaluation sessions to gather insights, validate assumptions, and iterate on the product to meet their needs effectively.

## 6 Business Operations and Funding:

Design thinking encourages a holistic approach, considering both the business and user perspectives. Explore alternative funding options such as grants, partnerships, or crowdsourcing. Utilize rapid prototyping to showcase the value proposition and attract investors. Continuously evaluate and optimize business operations to minimize costs and maximize resources while maintaining focus on product development.

**By applying design thinking methodologies, the e-mental health startup can tackle these challenges in a systematic and user-centred manner. It enables the team to empathize with users, generate innovative ideas, prototype and test solutions, and iterate based on user feedback. This approach enhances the likelihood of developing sustainable and impactful products that effectively address the identified challenges.**



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**DESIGN STRATEGIES  
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SUSTAINABLE  
IMPLEMENTATION**  
[DESIGN THINKING]:

**OVERCOMING BARRIERS, FINDING  
STRATEGIES TO SPREAD THE USE OF  
THE TOOLS AND DEVELOP THEM IN  
OTHER FACILITIES**