Bridging Disciplines through Visualization: Managing a VR Music Therapy IT Project

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Abstract
In an era where technological innovation intersects with healthcare and psychological support, managing interdisciplinary IT projects demands novel approaches to communication, planning, and collaboration. This study explores the pivotal role of visualization in bridging disciplinary gaps during the development of a VR-based music therapy solution. By integrating a structured set of visualization tools across each stage of the MAISTRO project lifecycle methodology—designed for AI and software-intensive systems—we offer a practical framework for improving understanding, decision-making, and coherence in multidisciplinary teams. The proposed approach is grounded in a real-world use case and includes tools such as the Osterwalder Business Model Canvas, OLAP cube visualizations, UML diagrams, and Likert scale evaluations. The research highlights how visualization not only enhances cross-domain communication but also facilitates transparent stakeholder engagement and outcome evaluation. Our findings contribute to the broader discourse on managing complex, cross-sector projects by offering a replicable model for integrating visual thinking into the entire project lifecycle.

Keywords
interdisciplinary research, multidisciplinary, VR technology, music therapy, Osterwalder Business Model Canvas, OLAP, Likert scale

1. Introduction

In the contemporary landscape of IT project management, the rise of multidisciplinary teams introduces both unique challenges and unprecedented opportunities. Projects at the intersection of healthcare, psychology, and digital technology—such as the development of VR-based music therapy tools—require not only technical expertise but also a deep integration of knowledge from diverse domains. While existing literature proposes various frameworks for managing interdisciplinary and cross-sector collaborations, the role of visualization as a bridging mechanism for communication, planning, and mutual understanding is yet to be highlighted wider.

This paper addresses this gap by systematically integrating visualization techniques across all stages of the MAISTRO methodology, a modern project lifecycle framework tailored for artificial intelligence and software-intensive systems. We propose a practical approach to enhancing project coherence through the strategic use of visual tools.

The scientific novelty of this research lies in the structured application of visualization instruments tailored to each stage of a multidisciplinary IT project with a therapeutic focus. Unlike prior studies that emphasize team formation or conceptual planning, we offer a complete visualization pipeline—from business needs alignment to long-term operation—tested on a real-world use case: the development of a VR-based music therapy solution. This framework not only

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improves cross-disciplinary communication but also supports transparent decision-making and outcome evaluation, which are essential in complex digital healthcare innovations.

2. Analysis of literary sources on the peculiarities of organizing multidisciplinary research and projects

In academic literature, the peculiarities of organizing interdisciplinary research and implementing projects that integrate various fields of knowledge are actively discussed. Ligtermoet et al. [1] developed a framework to be used as a heuristic device to support multidisciplinary research teams in practical engagement planning. In this context centered 4 P`s s knowledge co-production framework, the four Ps are Positionality, Purpose, Power, and Process. A fundamental requirement of co-production is that research is firmly situated within the context where researchers and collaborators work, and the process of defining 'context' should be collaborative. Considering positionality as the individual's worldview allows teams to create a shared understanding while reflecting on their own dynamics of power, knowledge, or values. A clearly defined and shared purpose is essential for supporting co-production, ensuring team cohesion, and sustaining progress when (or if) facing challenges. Power shows up in how things get done and what outcomes are prioritized. The process in 4Ps means working together fairly, transparently, and thoughtfully. The approach was examined with four sustainability issues research teams through a series of workshops aimed at helping them identify suitable co-production strategies. Unfortunately, no information on the tools being used within the workshops to manage the collaboration were given in a paper.

Lindvig et al. [2] mentions a cross-sector, interdisciplinary network of environmental scientists and engineers as well as an interdisciplinary program in the Baltimore-Washington region, Baltimore County, Maryland, USA. Within this program, CoNavigator was utilized, an interactive tool that supports interdisciplinary collaboration and learning. CoNavigator offers a structured way to map and visualize ideas, goals, and concerns, employing visual and interactive techniques to help project participants from different fields align expectations, improve communication, and integrate diverse viewpoints. This interactive tool structures the mapping and visualization of ideas, goals, and concerns. Using visual and interactive methods, CoNavigator helps project participants from different disciplines align expectations, improve communication, and integrate diverse perspectives. With the CoNavigation sessions, the master`s interdisciplinary program development was illustrated. In the CoNavigator sessions, the staff, trainees, and students collaborated offline, with the CoNavigator flat-map on the screen being projected. So, the CoNavigator flat-map can be considered as the informational model of the master`s program being developed.

Ibeh et al. [3] describes the SEFLAME-CM model, an innovative approach for analyzing natural resource conflicts at the local community level. This six-step non-linear model was developed to involve various experts in the creation of possible conflict-resolving scenarios. The steps are 1) joint problem analysis and structuring; 2) modeling and simulation; 3) spatialization of information with geoinformation; 4) visualization of the results from step three; 5) comparing the model with previously used models; 6) evaluation of possible scenarios developed. In this case, these scenarios are a kind of model, too.

In the above-mentioned approaches to multidisciplinary project management and preparation, not much attention was paid to the visualization of the process. The visualization tools or techniques mentioned by Lindvig et al. [2], were used in a group of the same sphere, the education. There is no doubt that the visual component enriches and fosters communication, which is extremely important for groups of specialists from very different spheres. That is why the aim of this research is to consider some basic visualization techniques at each stage of project management and implement the best techniques to manage a multidisciplinary project with a strong IT component. This project aims to develop a VR tool with an analytic component for music therapy and gathers specialists in psychology, art therapy, VR technologies [4], data analysis, and software developers.

The methodology of the management of the projects with the IT component depends on the project size, complexity of requirements, team qualifications, and desired level of flexibility. The most popular methodologies are Waterfall, Agile, Scrum, V-model, etc. Petrin et al. in [5] methodizes Pradeep Patel's four successive and well-defined macro-stages in the project lifecycle, with the MAISTRO methodology. This methodology was developed to provide a systematic and flexible framework for the development of artificial intelligence systems in the lifecycle and will be used as a methodology for the VR tool development project for music therapy. For each stage of the MAISTRO methodology, we will provide a list of visual tools to be used in multidisciplinary project teams to visualize the processes for shared understanding and communication, to visualize the requirements and risks for project planning and management, to visualize the results for reporting, etc. At each stage, one of the tools will be chosen to apply to a multidisciplinary project of VR technology for music therapy development.

In Fig. 1 we present the methodology MAISTRO from [5], which is given in comparison with the project lifecycle by Pradeep Patel, and process groups of a project, recommended by the Project Management Institute.

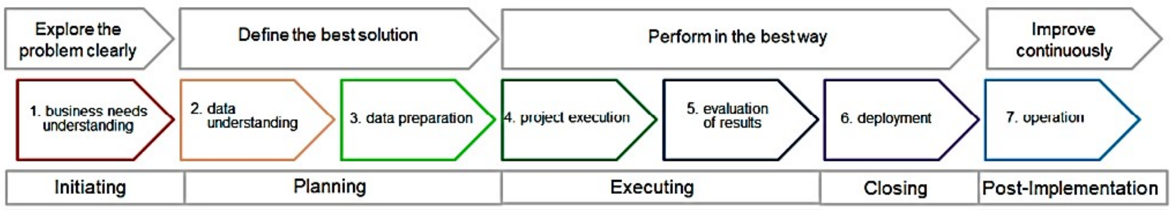

Figure 1: Methodology MAISTRO phases in comparison with project life cycle by Pradeep Patel and process groups of a project by the Project Management Institute [5].

In Table 1, we listed the most basic visualization tools of the many to be used at this stage, and the one implemented will depend a lot on the project manager's experience.

Experts as the participants of the multidisciplinary project are being chosen for their high experience. At the same time, they are non-specialists in some other areas of expertise, and effective bridging of teammates is crucial for optimizing information exchange. By choosing the appropriate visual tool at each stage, the project manager enables the quality of communication and the success of the entire project. The basic criterion to choose the tool among suggested, was its possibility to be used by a multidisciplinary team. Simple examples of the visualization tools were presented to team members, and the best tool was chosen after short discussion, by the majority of votes.

3. Visual tools analysis

We will provide a short tool comparison and then a rationale for our chosen visualization method for VR technology for music therapy development. Using collaborative tools in IT project management is another evident approach, and Miro, Lucidchart, or Notion are the possible choices.

3.1. Business Needs Understanding

Participants will align vision, value, and expected outcomes across disciplines at this stage. All the visual tools mentioned are customer-centered; they can be used for information gathering and strategic planning. In our opinion, the broadest view on a business process is the Osterwalder Business Model Canvas. In contrast, Value Proposition Canvas is more focused on product-to-customer fit, Stakeholder Maps are into the network of people that are involved in the business, User Persona is focused on the representation of a user type, and Empathy Maps are focused on the emotional state of a user. For the VR technology development project, the Osterwalder Business Model Canvas was developed in a Miro and is presented in Figure 2.

Table 1
Visualization Tools by MAISTRO Framework Stages

Stage	Description	Recommended Visualization Tools
I. Business Needs Understanding	Aligning vision, value, and expected outcomes	• Osterwalder Business Model Canvas [6] • Value Proposition Canvas [7] • Stakeholder Maps [8] • User Personas [9] • Empathy Maps [10]
II. Data Understanding	Gathering knowledge about sources, formats, and gaps across modalities	• Data Flow Diagrams [11] • Concept Maps [12] • Knowledge Graphs [13]
III. Data Preparation	Structuring, transforming, and integrating multimodal data	• OLAP Cube Visualizations [14] • Data Lineage Diagrams [15] • Data Profiling Charts [16] • Interactive Dashboards [17]
IV. Project Execution	Designing software logic, system interactions, and user flows	• UML Diagrams [18] • Flowcharts [19] • BPMN (Business Process Model and Notation) [20] • Sequence Diagrams [21] • ER (Entity-Relation) Diagrams [22]
V. Evaluation of Results	Measuring therapeutic, functional, and experiential outcomes	• Likert Scales [23, 24] • Radar Charts [25] • Feedback Matrices [26]
VI. Deployment	Communicating rollout strategy and testing status to stakeholders	• Gantt Charts [27] • Deployment Pipeline Diagrams [28] • Kanban Boards [29] • Risk Matrix [30] • CI/CD Flow Visuals [31]
VII. Operation	Monitoring long-term use, gathering user feedback, and planning iterations	• Monitoring Dashboards (e.g., Tableau) [32] • Visualized Feedback Loops [33] • Maintenance Schedules [34]

For multidisciplinary projects, the collaboration might be improved with using different colors coding for the different domains, for example, green for the psychology, yellow for the tech, orange for the therapy, etc. It is essential to mention that the data analysts are mentioned among Customer Segments because the data collected might be used for research, decision-making, or training AI models, to analyze patient data to improve therapeutic protocols or to use data for intellectual analysis or business purposes.

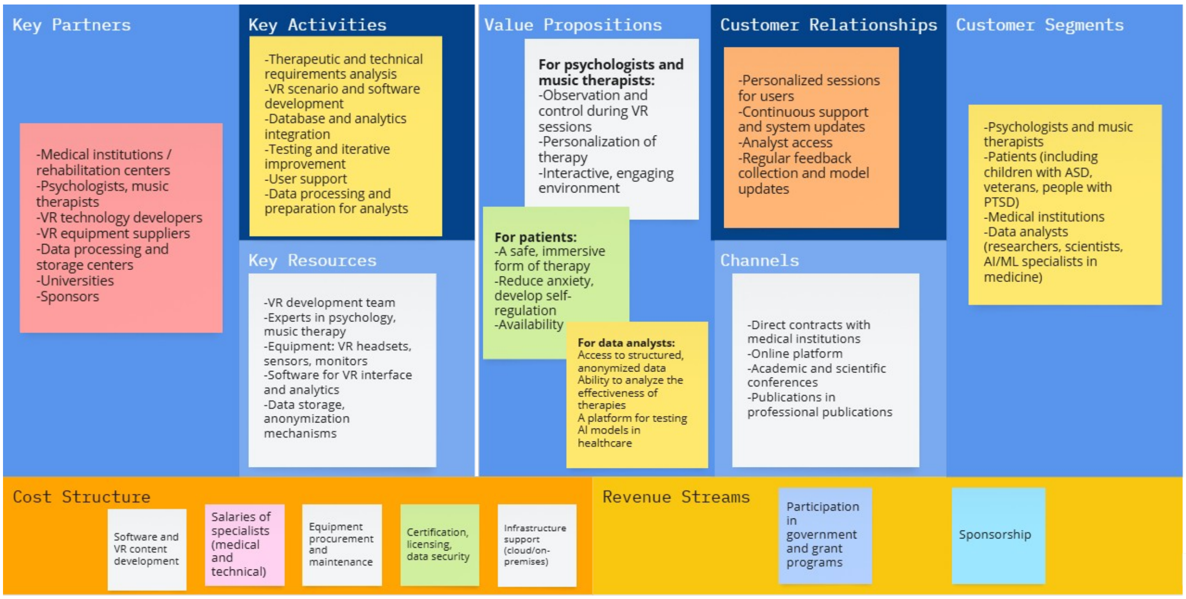

Figure 2: Osterwalder Business Model Canvas for VR technology for music therapy

3.2. Data Understanding

In this stage, various knowledge about data is gathered, and among visualization tools, in Table 1 are mentioned Data Flow Diagrams, Concept Maps, and Knowledge Graphs. They all emphasize the connection between pieces of information. Yet, Data Flow Diagrams are more procedural and might be of lower value for the interdisciplinary teams with non-IT experts participating. Knowledge Graphs are more about integrating and building a prosperous, interconnected representation of information from various sources, which might be overwhelming for the new participants. Concept Maps will be the best choice for describing the project being developed, among others, because of their simplicity.

Fig. 3 presents the Concept Map of the Data Understanding stage of the IT project on VR technology for music therapy.

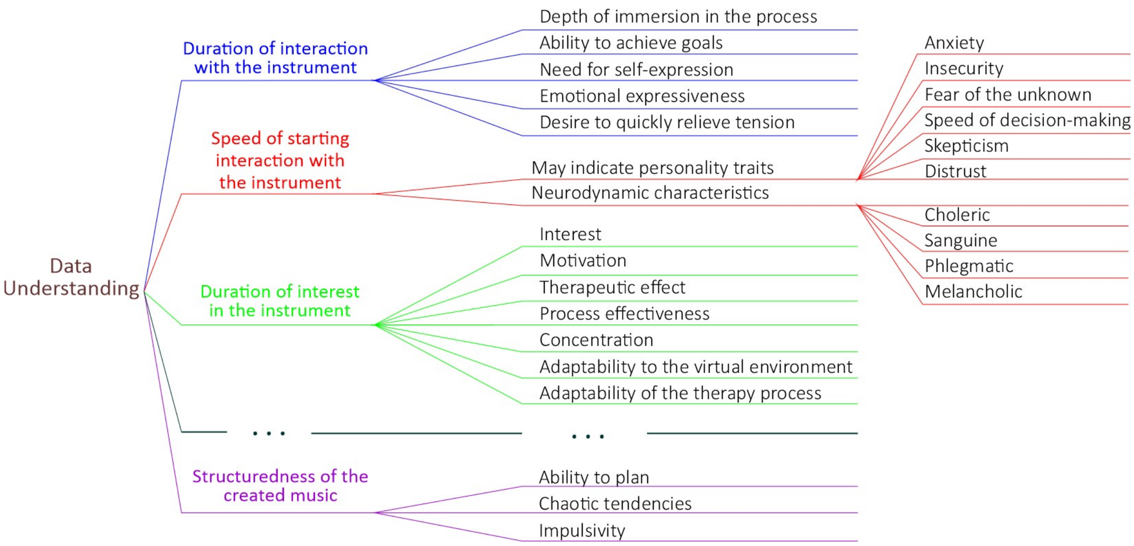

Figure 3: The Concept Map of the Data Understanding stage of the IT project on VR technology for music therapy

3.3. Data Preparation

At this stage of the project management, the structuring, transformation, and integration of multimodal data will take place. OLAP (Online Analytical Processing) Cube Visualizations, Data Lineage Diagrams, Interactive Dashboards, and Data Profiling Charts were mentioned as visualization tools. All the tools being applied will add to data understanding and quality improvement, and such visualizations can become the foundation for the data analysis. Each tool has key features; for example, the Interactive Dashboards visualize real-time data, Data Profiling Charts are focused on the study of the statistical data, Data Lineage Diagrams mapping data flows, and OLAP Cube visualization's purpose is to explore data from different dimensions to find trends and patterns, which better fits the purpose of the project being developed. Fig. 4 presents the OLAP Cube with data that can be collected from the music therapy. The data to be collected were analyzed by the VR software designer, data analyst, and music therapist and are based on the Concept Map visualization from the previous stage (Fig. 3).

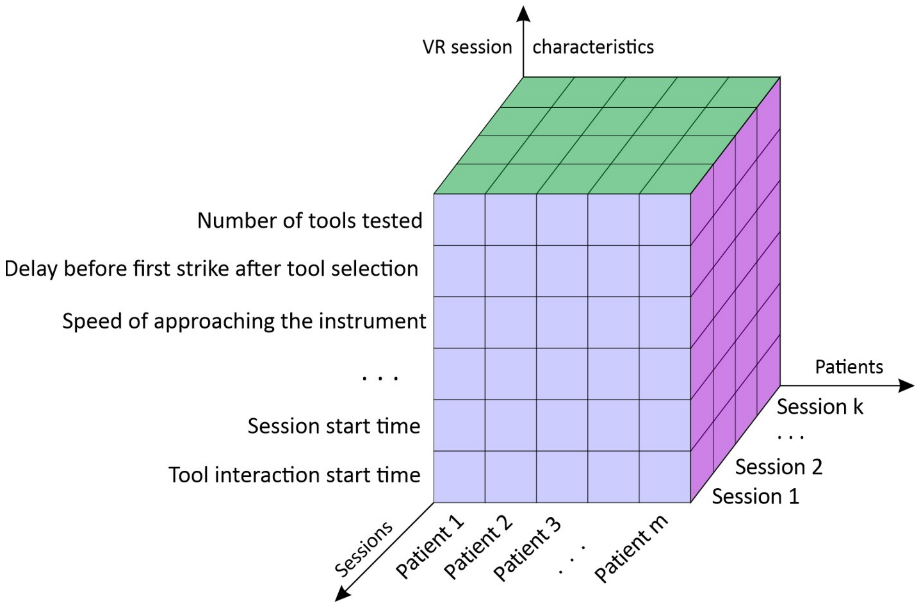

Figure 4: The OLAP Cube visualization for the Data Preparation stage of the IT project on VR technology for music therapy

OLAP cube slices will allow data analysis in different directions, for example, analyze the VR session for the patient, analyze the specific characteristics of the VR session for the patient through the sessions, etc.

3.4. Project Execution

We shall discuss designing software logic, system interactions, and user flows using the VR technology described in Osterwalder Business Canvas. The development of such technology might take a rather long time, which is why we decided to start with an MVP (Minimal Viable Product) for the VR technology for music therapy, which will have the basic desired functions of the technology. For the MVP, we discussed the minimal set of requirements, and to formalize it the user stories approach was used [35, 36]. A user story is a concise statement that captures a user's requirements in a simple, structured format. It typically includes three key elements: the role, the action, and the benefit. The role identifies the perspective from which the user interacts with the system. The action describes what the user wants to do, while the benefit explains the purpose or value of that action. In our work, we have adapted the structure of the user story based on the approach proposed by [36]:

As a <role of the user of the MVP of the VR technology for music therapy >, I want to < VR technology function> so that <benefit of implementing this function >.

Using this template, eight user stories were collected in an easy-to-read list and natural language format (see Fig. 5).

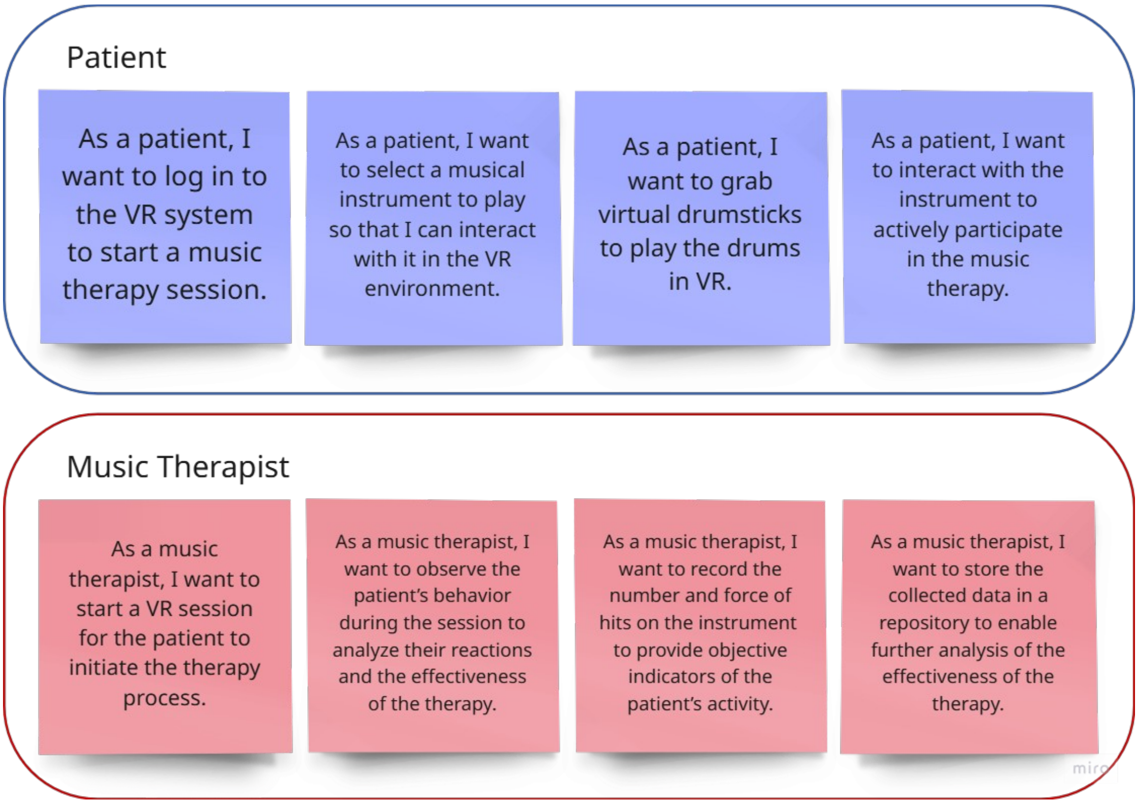

Figure 5: User stories for the MVP of VR technology for music therapy

Now, as the visualization tool for the project execution stage, the UML Diagrams, Flowcharts, BPMN (Business Process Model and Notation), Sequence Diagrams, and ER (Entity-Relation) Diagrams were mentioned in Table 1. These tools are focused on process execution; BPMN is better for rather complex business processes and demands the knowledge of the notation. The Entity-Relations Diagrams present relationships between data entries. Sequence Diagrams are promising in showing the chronological order of interactions. Although Flowcharts are relatively easy to understand and create, at this stage, we prefer using the UML diagrams as a standardized tool for software development.

Analyzing the user stories, three actors were eliminated: the Patient, the Music Therapist, and the Data Storage System. Fig. 6 presents the appropriate Use Case Diagram of MVP of VR technology for music therapy.

As you can see, the Music Therapist user story was divided into functions for two actors. It seemed appropriate because of the technological solutions. Also, the VR developer actor was added to create the VR modules, following the therapist's suggestions. We intend to upgrade the Data Storage functions into a Data analysis unit with an intellectual component [37, 38].

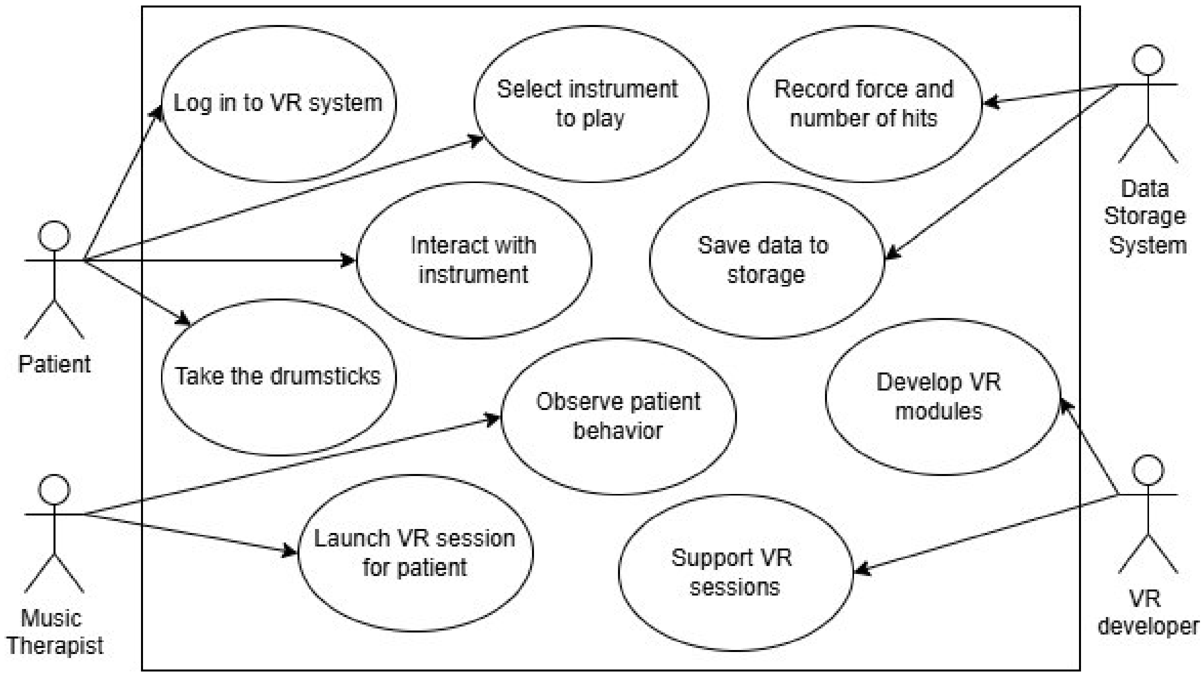

Figure 6: Use Case Diagram for the MVP of VR technology for music therapy

We added Figure 7 to present the object inspector while testing the VR scene. Unity, the cross-platform game engine was chosen to develop the VR environment.

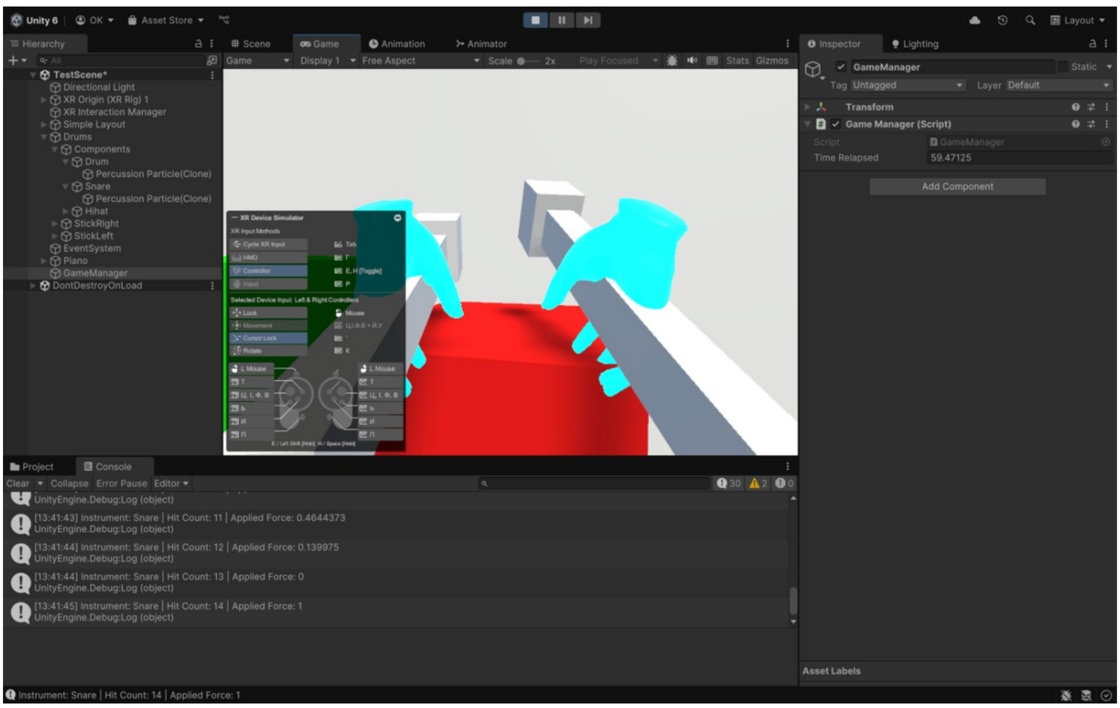

Figure 7: Object inspector while testing the VR scene

The number of particles visually corresponds to the strength of the strike—the harder the hit, the more vibrant the effect (Fig. 8).

According to Use Case Diagram, the force and number of hits should be calculated and saved. Fig. 9 shows the csv file with the results.

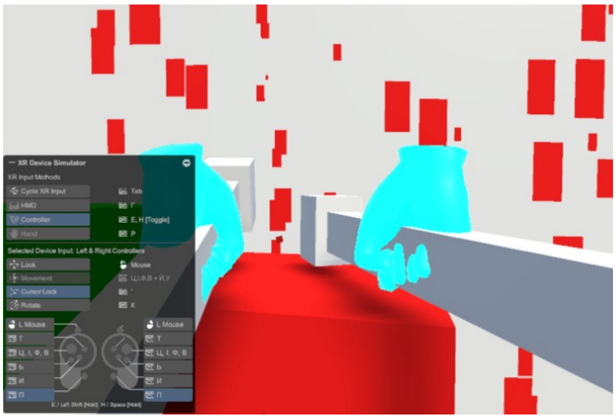

Figure 8: Striking the virtual drum generates colored particles; stronger hits produce more particles.

3.5. Evaluation of Results

Measuring therapeutic, functional, and experiential outcomes can be supported with several visual tools, such as Likert Scales, Radar Charts, Feedback Matrices, as mentioned in Table 1. These tools help visualize feedback data; the Radar Charts that quantitative data are presented in the form of a polygon; in Feedback Matrices and Likert Scales, qualitative data are used, and the latter method converts it into qualitative and is comparatively easier for interviewers once the scale is developed.

The experiment on art therapists using the VR-sessions was facilitated by author of the paper, Vasyl Andrunyk. The VR headset Meta Quest 2 was connected to a PC, and the VR environment was projected onto a screen using a projector linked to the PC. Five participants were engaged the VR session, 4 female and 1 male. Among the participants, three art therapists had previous experience with VR sessions, and two had no prior experience. The VR drum game session was led by a facilitator, who provided an introduction to the main functions of the headset and controllers. After completing the session, each participant helped the next one get familiar with the controllers. For the after-session interview, the Likert-scale questionnaire was developed. Figure 10 illustrates the concept of a Likert-scale questionnaire designed for one of the user roles — the Music Therapist. A Likert scale is a common rating scale used in surveys to gauge participants' opinions, attitudes, and motivations [25]. It presents a range of response options, typically spanning from one extreme viewpoint to an opposing one, and may include a neutral midpoint. The questionnaire was developed using Google Forms to explore initial feedback collection. More accurate analysis of the participants` responses is yet to be presented, and now we can mention that two participants rated their VR-session as very satisfied, three participants mentioned that the session was satisfied. Also, 4 out of 5 participants were satisfied with an ease of controllers use. Three participants rated their ability to effectively support patients during the VR session as satisfied, and two – as a neutral. During after-session discussion, participants mentioned they were «enthusiastic and excited» before the session, and «satisfied and inspired» after the session.

3.6. Deployment

Informing stakeholders about the rollout plan and testing progress is to be done using one (or a combination) of some visualization tools, such as Gantt Charts, Deployment Pipeline, Diagrams, Kanban Boards, Risk Matrix, CI/CD Flow Visuals. Currently, the VR technology project for music therapy development is at the beginning of the deployment stage, and the pool of patients is being prepared; we are still considering which tool to choose. Combining the Gantt Charts, which emphasize task dependencies in time, seems promising.

instrument_data

Total time spent playing: 89.55 sec	
Instrument: Hihat	
Hit Count	Applied Force
1	0
2	1
3	1
4	0
5	0
6	1
Instrument: Drum	
Hit Count	Applied Force
1	0
2	1
3	0
4	0.7092436
5	0
6	1
7	0
8	0
9	1
Instrument: Snare	
Hit Count	Applied Force
1	0
2	0
3	0
4	1
5	0
6	0
7	0.6924565
8	0
9	1
10	0
11	0.4644373
12	0.139975
13	0
14	1
15	0

Figure 9: Csv file with force and number of hits data

3.7. Operation

The monitoring of long-term use, gathering user feedback, and planning iterations are yet to be performed for the project. All the tools for this stage, mentioned in Table 1, support visualization of the continuous improvement with the ongoing process of monitoring, gathering feedback, and planning for future iterations.

Conclusions

This study demonstrates that visualization is not merely a supporting component but a fundamental driver of success in multidisciplinary IT projects. By applying stage-specific visualization tools within the MAISTRO framework, we enable a higher degree of mutual understanding, transparency, and data-driven decision-making among stakeholders with diverse professional backgrounds.

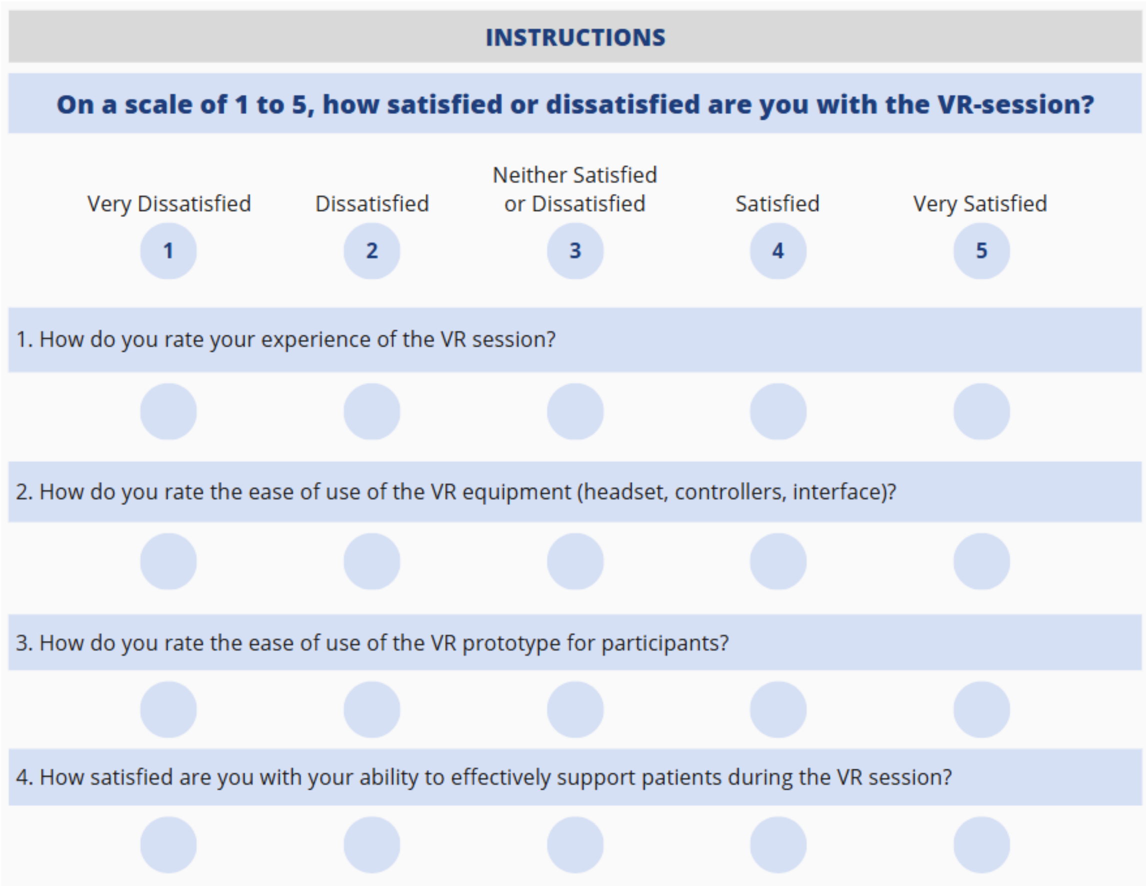

Figure 10: Questionnaire for the Music Therapist

Our case study, centered on the development of a VR tool for music therapy, shows that carefully selected visualizations such as the Business Model Canvas, Concept Maps, OLAP Cubes, and Deployment Pipelines significantly enhance collaboration between software developers, psychologists, therapists, and data analysts. The visual methods served as cognitive anchors and artifacts for ongoing negotiation and planning.

This approach highlights the potential of visualization to bridge gaps between disciplines [39], particularly in domains where both empathy and precision are essential. In future research, we plan to explore integrating real-time collaborative visualization environments and the development of domain-specific visual toolkits that can further support hybrid teams in healthcare technology innovation.

Declaration on Generative AI

During the preparation of this work, the authors used GPT-4o and Grammarly in order to: Grammar and spelling check. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the publication's content.

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