REIMAGINING DUNGEONS AND DRAGONS: A HYBRID ROLE PLAYING EXPERIENCE

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1. INTRODUCTION

In March 2020, government measures to reduce the outbreak of coronavirus resulted in the temporary closure of non-essential businesses and forced millions of people to work from home. These work from home measures caused many office workers turning to digital work tools, such as collaboration platforms and video conferencing tools, to continue working remotely. During this time, many organisations began to focus on developing collaborative environments that could support people working together in both face-to-face and remote collaboration.

Similar developments toward the use of digital tools for collaborative work were also taking place in gaming communities. Even though individuals were restricted from social gatherings, popular tabletop roleplaying game (TTRPG) Dungeons and Dragons (D&D) reported an increase in sales of content and materials during the coronavirus pandemic (Whitten, 2021). These developments have been linked to a recent increase in the online presence of the game, in the form of virtual gaming, live streaming, and an expansion of digital resources. Popular web platforms, such as D&D Beyond and Roll20, let players host game resources online and play content in digital form which has provided an opportunity to move in-person games into the online space. However, this transition has highlighted the difficulties of developing effective and accessible online collaborative environments (Thorén, 2020). Most players reported that remote play provided a sub-standard gaming experience when compared to in-person play (Scriven, 2021). Online play provided a more streamlined gaming experience and helped to maintain social connections during the pandemic, however, the software was often unreliable, and the digital environment failed to reproduce the atmosphere of in-person games (Scriven, 2021; Thorén, 2020; Yuan et al., 2021).

In this paper, we introduce an interactive system that can support both physical and virtual interactivity through a collaborative tabletop application. The goal of our application was to reduce the tensions between in-person and remote play that had been established in the previous literature and offer a collaborative experience that incorporates both traditional and digital forms of role play that meets the requirements and demands of the users. The paper involves the development and evaluation of the interactive system, including participant-based evaluation methods on the usability, learnability, and functionality of the system.

2. DUNGEONS AND DRAGONS AS A COLLABORATIVE ENVIRONMENT

2.1 Dungeons and Dragons

D&D is a fantasy tabletop role playing game that is commonly regarded as the beginning of modern TTRPGs and the resulting role-playing game industry (Williams et al., 2006). The game allows players to create and roleplay characters in a medieval fantasy world of beasts and monsters as they complete epic quests and level up together. The Dungeon Master (DM) is the narrator of the game and is responsible for telling the story, acting out all non playable characters (NPCs) and filling the world with details and challenges for the players to discover. To create excitement and unpredictable twists, the outcome of nearly every action in the game is determined by the roll of dice and despite the presence of a narrator, the game is highly interactive and non-linear. Each player has the freedom to decide their goals, actions and overall playstyle resulting in a fun and social experience for everyone who participates in the game.

2.2 Collaborative environments

In recent years, the publishers of the game have developed digital resources that have allowed players to transition from in-person gaming to remote play online. This has taken players from

physical environments to online environments that are designed to host Computer Supported Cooperative Working (CSCW) and collaborative work in general. For collaborative environments to work effectively there are a number of key features that must be taken into consideration (Benyon, 2019, 396). For example, (a) the interactive system must offer collective benefits to all the individuals that use it, (b) there needs to be enough people using the system in order to be effective, (c) the system must maintain a balance between public and private spaces, and (d) it must be possible to evaluate individual actions and contributions. These features have often been overlooked in existing digital spaces and the digitisation of the game ends up being "a process of interpretation rather than translation" (Rogerson et al., 2016, p. 3965) in these cases. Real-life, in-person experiences are notoriously difficult to replicate using digital tools.

Previous literature has explored the advantages and disadvantages of playing D&D through digital hardware and software, as well as the overall experience of transitioning from physical to virtual tabletops during the pandemic (Scriven, 2021; Thorén, 2020; Yuan et al., 2021). Nearly all of the discussion around the adaptation of the game for remote play was based on the use of communication and video conferencing tools, online digital platforms, and virtual tabletops. Players made use of virtual tabletops, using subscription based websites such as Roll20 or Foundry, to try and preserve the features of traditional physical tabletops (Yuan et al., 2021). Video conferencing platforms such as Zoom and Discord were used to facilitate communication and presence, and then sound effects were streamed through platforms such as Youtube and Syrinscape (Scriven, 2021). Other players chose to dismiss the use of visually immersive tools due to their intricate nature and instead chose to use their imagination alongside videoconferencing.

Despite the unreliable nature of the technology, players reported positive experiences around the transition to remote play, including easy to play sessions, convenience in organising play sessions, and engaging multimedia elements such as terrain, weather, animations, and pre-calculated dice rolling (Scriven, 2021). However, there was a stronger trend towards the negative features of remote play. Unreliable software, weak internet connections, poor audio, background noise, distractions, screen fatigue, the loss of face to face contact, and the absence of physical interaction led to unfavourable gameplay conditions for many users (Yuan et al., 2021; Scriven, 2021). In fact, a thematic analysis of player attitudes towards found that 34% of players reported that they disliked the experience, while 48% felt that it was better than nothing at all (Scriven, 2021). It was concluded that TTRPGs served a higher purpose than entertainment or escapism. They offered a safe environment to explore moral dilemmas (Adams, 2013; Sidhu, 2021), promote moral development (Wright, 2020), and maintain social connections (Abbott, 2021) through collaborative storytelling and creative control.

3. THEORIES AND FRAMEWORKS

3.1 The TACIT framework

The Territory, Awareness, Control, Interaction and Transitions (TACIT) framework (Benyon and Mival, 2015) for designing collaborative environments was used to structure our initial design (see below, Table 1). This framework helps designers deal with the design of physical spaces for collaboration, digital spaces and blended spaces.

	Physical space	Digital space	Blended space
Territoriality	The system is designed to sit on a flat surface and be as thin as possible. So it won't draw too much attention to it and disrupt the social interactions between players that are a crucial part of D&D (e.g. eye contact, facial expressions, dialogues, playing things out). The additional web app (which is also available on smartphones) allows players to have their own private space.	There are three main spaces. A public space in the middle of the game tablet visible and accessible for all players. Its purpose is to show the most important context for the whole group (e.g. maps, enemies, player location). Then there is a semi-private space for each player containing all the information related to the characters (e.g. attributes, conditions, inventory). This space is intended for a single user only, but due to the design of the game tablet, it's possible for other players to access information shown there. For this reason we have created the webapp as a private space. People can use it to make changes to their characters, prepare for a game, and most importantly, secretly exchange information with the gamemaster or other players.	In case multiple devices are used remotely, the player's UI and seating positions are synchronized with all devices by default. I.e. each game tablet will show the UI even of those players that are not physically present. If that behavior is not intended, it's possible to disable the synchronization.
Awareness	D&D is usually played with physical figures and dice. That's why our design encourages people to put real figures on the game tablet to indicate where each player is located. In addition, physical dice can be used instead of the digital ones. The result will be recognized by the system as well. This way, all players are aware of the others and their actions.	To increase awareness in the digital space, the digital dice will also be displayed in the centre of the table for everyone to see the results. If a player's health is low, a visual effect visible to all players will indicate that they may need help.	In addition to the GUI synchronisation, we are considering adding a video/audio conference system. For example, people could use their phone to see and talk to each other when using multiple game tablets remotely.
Control	Players can choose their seat at the table by simply putting their NFC-Tag on the table and then dragging their GUI to the location they want. In addition to that, people can move it freely and place it on any surface that is large enough and has access to power and internet. The users can therefore place it in the way that is most comfortable for them.	Every player has its own space (GUI with character information) on the table. They're able to move it around by drag & drop. They can also customize the GUI by choosing their own skin/theme and rearranging widgets.	Using the game tablet (physical space) and the web app (digital space) at the same time is possible. Both are synchronised using a web server.

Interaction	In a D&D game, all players can access the public and their private space at any time. They can also initiate an action at any time. The DM then decides if a player has to roll the dice. In such a case, each player has their own set of dice (physical or digital) that they use.	To make the interface accessible, each user is able to fully customise and expand the GUI. In addition, the GUI can be scaled up or down to some extent.	Should, perchance, the occasion arise that the users are not able to play D&D, providing a tutorial may be considered.
Transitions	In our current design, there are no transitions in the physical space for which we consider a specific design choice.	When preparing or playing a session of D&D, different types of media can be used (e.g. images, music, video). In the web app, the user can upload this media for later use with the game tablet.	If the gamemaster or a player wants to share some information with another player only, they can use the web app to send messages to each other. To read these messages it will be necessary to open the web app on a different device (e.g. a smartphone). A notification is then displayed on the game table so the user knows that a transition is necessary.

Table 1. Overview of the interactive system using the TACIT framework

3.2 Requirements list

Using the literature and our findings from a brief thematic analysis (see Section 3.3), we then identified the goals and aspirations of the users and generated a list of requirements for the interactive system (Robertson and Robertson, 2012). See Table 2 below for details.

Reference number	Summary	Source	Justification
A1	The system shall be made in the format of a board	User	A board will enable the users to change the physical location they play at to suit their needs.
A2	The tabletop shall be made up of one uninterrupted touchscreen	Designer	An uninterrupted touch screen will enable seamless surface to minimise disruption to the players. It will also allow users to place several systems next to each other
A3	The touchscreen shall be water resistant	User	A water resistant screen will provide a sense of security to players that like to drink while using the board
A4	The touchscreen shall be scratch-resistant	User	A scratch resistant surface enables users to roll physical dice and move hard objects around

			on the screen without risk of damaging it.
A5	The system shall be capable of supporting a minimum of 5 concurrent players.	User	The usual reported size for dnd groups is 4-5 people.
B1	The system shall be capable of supporting a dedicated GUI for the GM with options for example changing the content displayed on the table, making changes to the player stats and changing the overall mood of the scene.	User	A GM has specific tasks in a dnd game that requires a tailored user interface.
B2	The system shall be capable of supporting a dedicated GUI for each player with player stats (e.g. attributes, condition, abilities), images, private inventory and spells.	Designer	A player has an individual character with individual statistics and attributes that needs to be tracked.
B3	The system shall be capable of storing and displaying maps, images, enemies, game data (character position etc).	Designer	Storing and displaying assets and game data gives the system its baseline functionality which is needed to provide value to users
B4	The system shall be capable of communicating with a web-based app.	Designer	Will enable the system to design and share assets between users
B5	The web app shall be capable of preparing game sessions in advance by creating scenes, items, NPCs, music, images, etc. that might be used while playing.	Designer	Allows GMs to prepare sessions in advance to make the experience during the session to be as frictionless as possible
B6	The web app shall be capable of editing character sheets, create and share maps, as well as be able to send messages to the players from the GM.	User	Will allow GMs to pass on secret knowledge to players that should know about without risk of letting other players know.
B7	The system shall be capable of accessing template content from the web in case the GM didn't prepare for a certain situation.	User	Allows GMs to adapt on the fly to changing and unforeseen situations
B8	The system shall support physical board pieces with NFC tags that can represent characters position on the map.	Designer	Allows the usage and interaction with physical game pieces to bridge the gap between a fully analog and the digital experience.
B9	NFC tagged characters shall be able to be used to choose a seat at the table.	Designer	See above…
B10	The system shall support physical dice and be able to read what the dice lands on	Designer	Allows for physical dice rolling, lack of which was a cited deficiency of a fully digital dnd experiences
B11	The system shall support a digital dice roll option every player can access.	Designer	Allows for dice rolling even if the players do not bring physical dice
B12	The system shall be able to toggle a scalable grid on and off using an overlay to enable a grid even on maps that were created without one	User	Some maps lack a grid on top of them to determine distance. A customizable grid overlay prevents issues with this.
B13	The system shall be able to provide fog of war overlays for maps, and be capable of doing so using a variety of textures	User	Allows for the GM to show only parts of the map that players are intended to see

A6	The system should be capable of supporting at least 6 concurrent players.	User	The max recommended amount of players by users was generally 6 players
B14	The system should be capable of sound output	Designer	To provide ambiance and sound effects to improve the players experience
B15	The system should be capable of connecting to online music platforms like Spotify or YouTube	Designer	Allows the system to easily acces music to make output music easier for GMs
B16	The system should save replays of games	Designer	Allows players and GMs to look back and review played campaigns
B17	The system should be able to store statistics of current and previous games	Designer	Allows players and GMs to look back and review played campaigns
B18	The system should be capable of communicating with smart home functions	Designer	Allows GMs to easily set ambiance during a game session
B19	The system should be capable of communicating with other tables to increase the play area or run concurrent campaigns.	Designer	Allows GMs to run concurrent campaigns and can also be used to increase the play area
B20	The system should be able to calculate game mechanics	Designer	To allow users who are not interested in the maths of the game to take part
B21	The system should be able to restore a session after an interruption	Designer	Error handling in case of power outage.

Table 2. Overview of the requirements of the interactive system. A denotes a nonfunctional requirement, while B a functional requirement.

3.3 Designing the interactive system

Our design process started with a compilation of collaborative design images that were found on Pinterest. One of the ideas that was found was an interactive table. After an afternoon of brainstorming we arrived at the idea of designing a table for D&D campaigns. A brief thematic analysis of a sample of Reddit threads discussing player experiences of creating their own virtual tabletops showed users favouring portable designs. One claimed to be an employee that worked on the Microsoft Surface in 2009 (table version) and stated that heat may be trapped on a flat screen which would cause warping over time. They also stated that their software could read dice rolls and locate figures placed on it. As most D&D campaigns are made for five individuals (one

game master and 4 players) the baseline user interface was made to accommodate that, by reserving one short side for the DMs interface and spacing out the players around the board. The reason the DM has a full short side is to accommodate the larger amount of notes that a DM needs in addition to controls for the map, sound effects, and images that can be shown on the board. Part of the value that the design brings to its users is enabling and enhancing players' experience even when some opt in to play remotely, the ability to manage dice rolling digitally was needed. One solution was to design a way to roll dice digitally via the board, but it is possible to have a touchscreen read a physical dice roll as mentioned earlier. Solving the dice roll and enabling the system to accept input both from a fully digital dice roll as well as a physical dice enables the system to meet a cited deficiency of playing D&D digitally which was the absence of physical dice rolling. To enable and encourage cooperation between users, the system can share assets between users and download said assets to the board. Our current solution is using a web app to enable users to design and share said assets. One concern that was raised during the evaluation was how users would be able to transfer assets and game data if the web app was removed or temporarily unavailable. The best solution from the group's perspective is to allow users to host their own servers with game data to enable remote play, and enable the board to receive data locally through usb storage media. Using these two methods should enable users to play and share data as well as assets even if the default provided web app is removed either permanently or temporarily, it also allows users without the internet to utilise these functions.

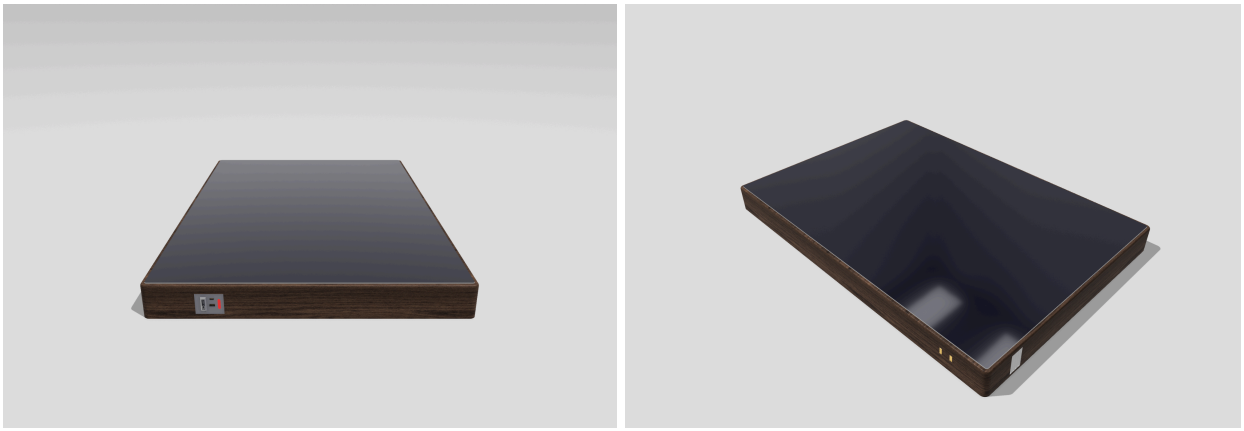

Figure 1. The first prototype visualizations included suggested connection interfaces. This design was slimmed down later in the design process.

3.4 Overview of the interactive system

The design of the system is intended to recreate the environment of a traditional table game, with the multimedia features and digital tools of online play. It will consist of a wooden frame with a multi touch display spanning the top surface as the main interface (see Figure 2). This tabletop design was chosen to preserve the original "feel" of the game, while improving immersion when compared to using a traditional computer.

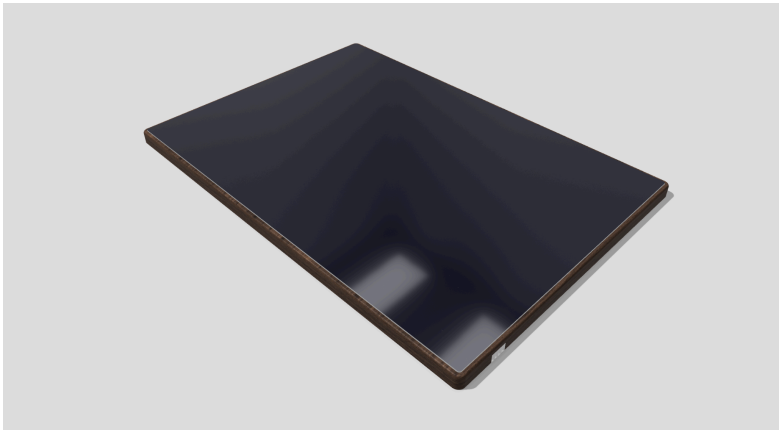

Figure 2. Final prototype design

The main features final version of our interactive system are summarised as follows:

Remote play. For many players, remote play broke the golden rule of tabletop roleplaying games which is to “never split the party” (Dungeons and Dragons, 2022). In our application, users can play campaigns with players around the world who also are using the product without many of the drawback alternative solutions provide. The system is designed to maintain the tabletop experience while seamlessly integrating online gaming functionality. Digital asset libraries including music, maps and characters could be added, customised and/or created within the system. Furthermore, network features will allow for synchronous multiplayer locally and worldwide. In this way, the platform provides a unified experience in which other players with the same interactive system can connect and interact with each other, even when not within physical proximity.

Streamlined play. Many players were using a minimum of three separate applications to facilitate their online gaming sessions so we developed a system that was capable of supporting audio, visual and communication features at the same time. Our collaborative tabletop application will host a library of multimedia elements, such as digital maps, ambient music, sound effects, weather options, animations, and pre-calculated dice rolling. The system will also feature multiple input methods including smartphones and near-field communication (NFC) accessories, such as dice or figurines, for players who want the physical experience.

Network and shared features. Players complained that creating stories and organising players' environments was time consuming and difficult. In addition to the library of content that is pre-installed onto the system, players will also have the opportunity to design and share assets through the networking features of the tabletop application. These could include pre-established stories or environments, as well as multimedia elements. This allows users to easily share and retrieve digital elements with other players.

Portable design. Despite originally designing the tabletop application for group environments, such as community gaming centres, user feedback expressed interest in the board for private use. For this reason, rechargeable batteries, a case, and a handle will be included for portability so that players can use the system in diverse settings.

4. EVALUATION AND RESULTS

Participant-based evaluation was selected as the primary evaluation strategy in our study. This method was chosen to ensure that we had real players involved in our evaluation and to maximise the amount of data that could be gathered from one session (Benyon, 2019, p. 250). The evaluation was guided using a test plan with the aims of the session, practical details, numbers and types of participant, and the tasks to be performed. Benyon (2019, p. 257) recommends at least 3-5 participants for the evaluation. Following these recommendations, three participants were selected based on their age-group, gender, and previous knowledge of playing TTRPGs and D&D. These demographics were informed by recent statistics showing that 61% of the D&D player base are men and 40% are under the age of 25 (Hoffer, 2020). This allowed us to focus on a small but homogenous group. Moreover, the participants had different experience levels in D&D gameplay, including beginner, intermediate, and expert. There was also a participant with a professional background in game development and user experience.

4.1 Prototype testing

Using the cooperative evaluation guidelines (Monk et al., 1993), we evaluated our lo-fi prototype with two participants (**P1** and **P2**) from our user group.

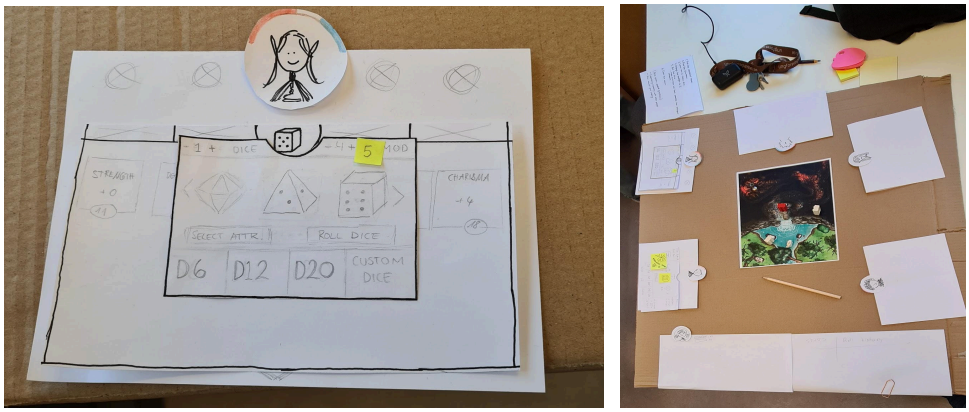

Figure 3 and 4. User interface (left) and full screen visualisation (right).

These people were briefly introduced to the system and later guided through a set of actions that they had to go through. This was done using a lo-fi paper prototype, where the key focus was to evaluate the user experience and early stages of the design idea. The participants were told to speak aloud during the process, and tell us their thought process. The scenario tested was a player rolling a dice, which is one of the most important actions in D&D. These actions included:

1: Find the character menu

2: Find the dice menu

3: Select the 6 sided dice

4: Change the modifier to 5

5: Roll the dice

-Make sure the attribute is set to strength

6: Close the menu

The participants were also asked a couple of follow-up questions regarding their experience with the prototype, where they were invited to share inputs or envisions for the design of the system. No participant had any problems with finishing the provided tasks. However, when selecting the 6-sided dice, they used different methods to get there. The less experienced player used images that visualised the dice, while the experienced player used the provided D6-shortcut. They had several inputs and thoughts throughout the evaluation of the system, which will be further discussed in results.

4.2 Interviews

To gather additional ideas, a more in-depth semi-structured interview was carried out with someone working in the game development field, specifically as a community manager. This participant, who we have chosen to call **P3**, also has previous knowledge about UX-design and is a frequent D&D player. The participant was informed that they could opt-out whenever or decide not to answer questions, and was asked if recording of the interview would be okay for transcription purposes. The whole system was explained in detail, and a couple of open questions regarding the design of the system and community spaces were asked. This helped us a lot with look and feel aspects as well as the useability of the system, where both community and personal use of the artefact were evaluated.

4.3 Results

The results of the evaluation found that there is demand for a similar product. One participant stated that the system would be gladly accepted by the community – D&D players embrace new ideas: New rulebooks, new characters and new ideas. Some expressed their surprise that such a product does not already exist. The appeal of the product is further backed up by solving the

need for players to be in the same space. **P3** explains that “It’s not easy to gather everyone in the same physical space…” and “it’s more than a screen on a table, it’s solving D&D as a whole, it’s a way to connect each other at a distance as well as in a physical space”. Users liked the idea of it being portable and readily available in both community spaces and in home environments. Communities have varying budgets, some would afford and love it while smaller communities might settle for pen and paper. **P3** mentioned that friendly local gaming stores could use this screen to their advantage as a meetup spot. Surprisingly, all participants that shared a preference wanted a bigger screen. Part of the challenge in partaking in D&D campaigns is the preparation since “creating your own content can be hard…it would help most with would be if there was a library and that you could download these maps.”. The design addresses this by providing access to available content online, while at the same time allowing creators to be creative with a dedicated space to share their work. It was suggested that the table should be flat and not clumsy to maintain the familiarity from analog gameplay. Another important part of gameplay involves sending secret messages. **P3** offered insight saying that “digital play made that more immersive… an app, or a website, would be really good, instead of through the UI”. This was in line with our design considerations in creating a companion (web) app. “I think one of the biggest things is that it shouldn’t be too controlled by rules and limitations. It should be easy to homebrew. It’s the thing that creates DnD… That’s where the focus should be.” (**P3**). The table should therefore be moddable, where the community builds the system. Alternatively, users can use already existing solutions for file transfer and cloud solutions to create a solution tailored to their needs. This would make the community stay alive even if the company or the server shuts down, making this screen sustainable.

Regarding the user experience of the player profile UI and dice menu, the participants easily completed each task provided and liked the customizable scrollable/widget based design. They did however have inputs that helped us design a second iteration of the prototype. One of these inputs was to be able to move widgets outside of the player screen UI onto the table, making it even more customizable. They also wanted more shortcut options when rolling dice, D10 and D4 also being common to use, and stats being selectable to roll quickly. We redesigned the dice menu based on these findings, making it easier to use.

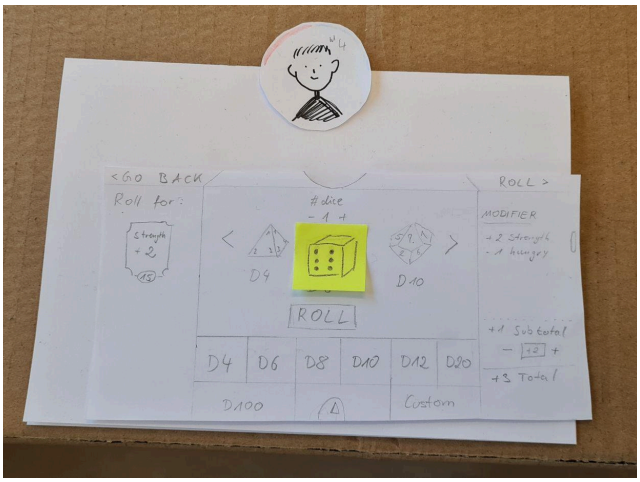

Figure 5. Updated UI of the player screen.

5. CONCLUSION

We believe this application solves online interactive gaming for Dungeons and Dragons with support for in-person and virtual cooperative gaming. The proposed solution draws from previous literature, interviews and other participant-based evaluation methods in providing a marketable product; exceeding immersiveness for D&D compared to currently available solutions in enabling remote play. Digital aspects enhanced gameplay. While the product provides an overall improved experience, it cannot fully replace in person interaction with current technology. Despite this, the evaluation found positive feedback from the participants in

terms of the design, functionality, and usability. There was also praise for the portable aspect, and the creative freedom that the system offers.

Figure 6. During the making of the lo-fi prototype.

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