

Requirements analysis and speculative design of support tools for TTRPG game masters

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ABSTRACT

In running tabletop roleplaying games (TTRPGs), game masters (GMs) are tasked with helping create and facilitate the building of a shared story between players based on player choices. In this paper, we look at how we can inform the design of computational tools for GMs through the use of qualitative interviews. We interview GMs about their process in preparing for and running a beginner TTRPG module, *Lost Mine of Phandelver*, and present to them a prototype of a computational tool built based on this module that has some of the features we believe would be useful in a GMing assistant, such as consolidating information for easier reference, serving as a brainstorming tool for GMs, and helping GMs keep track of what has happened in the game world. From these interviews, we collected insights into how the GMing process works within the context of a specific scenario and found which features GMs liked and what could be improved with our digital prototype. We also compare the results of these interviews to online advice for GMing the module. We use these insights in order to speculate about possible design directions for further development of a GM's computational assistant.

Keywords

role-playing games, storytelling, game masters, requirements analysis.

INTRODUCTION

In running tabletop roleplaying games, game masters (GMs) lead the game and take on a variety of roles, including providing challenges to players and improvising new content based on the players' character backstories, choices, and actions in the game world. In order to do this, GMs must be able to adapt the game on the fly, improvising from both prepared materials and the GM's imagination to build new settings, interactions, and conflicts that contribute to a shared story within a coherent game world. This can be a difficult task, and one that is especially daunting to new GMs who may also be struggling with other elements of learning how to run a tabletop roleplaying game. We are interested in how computational tools can help to assist new GMs, especially in providing more support for collaborative storytelling. In this paper, we present a qualitative study of such a tool, using interviews conducted with GMs and online advice for GMs, in order to assess how such a tool might work and what features GMs might want. This requirements analysis helps us understand how computational tools can help to support GMs and inform next directions for the design of such tools.

RELATED WORK

Here we discuss previous work on digital tools for TTRPGs that are similar to the computational tool we are interested in creating, as well as other works that use interviews as a basis for informing the design of such tools.

Digital tools for running TTRPGs

Currently there exist many different digital commercial and research tools for helping run TTRPGs. While there are many tools to help GMs facilitate their games such as virtual tabletop platforms or rulebook references for lookup, we are interested in digital tools that facilitating GMing, and discuss some existing examples of these tools below.

One example is *Undercurrents*, a tool that helps to facilitate hidden information communication within tabletop roleplaying games by helping the game master share information with only a single or a few players (Bergström 2011). The game master has access to an interface in which they can type and send messages, selecting the players to receive the messages. This serves both to relay information and serves in some capacity as a log of what has happened, maintaining the history of messages that have been sent between players. This helps maintain hidden information in what is traditionally an open space of information, and provides a way of keeping track of what has happened in the game so far.

An example of a tool using procedural generation in order to create content for TTRPGs is *Imaginarium*, which uses procedural text generation to provide descriptions that are constrained by the author but still have variations to them, using an authoring language similar to natural language (Horswill 2019). Horswill uses the example of generating various kinds of cats by declaring information about cats, the different possible ways that they can be, and how the information about cats relates to a hierarchy of information. He poses this as a casual authoring tool for game masters to develop semi-randomized content on the fly, for instance descriptions of monsters.

There has been some exploration of examining the storytelling techniques within TTRPGs (Flowers et al. 2006) (Cover 2014) and theorization of how one might build digital tools based on these techniques (Bergström 2011) (Peinado and Gervás 2004). Bergström uses interviews with TTRPG players and their own experience with TTRPGs to create categories of “frames” of storytelling, such as diegetic and non-diegetic communication, using this to inform the design of digital tools for TTRPG communication (Bergström 2011). Flowers also uses interviews in order to categorize GMing techniques such as attractors and detractors that GMs use to guide players through the story (Flowers et al. 2006). Tychsen et al. also discuss how GMs guide players through the story, using interviews and recordings of TTRPG play to examine how GMs guide the players through “waypoints” while still improvising the game’s story (Tychsen et al. 2009). These all help us better understand the GMing process and TTRPGs as they relate to digital storytelling, and point to this area as a space for further research and design. We also build on these studies to inform our qualitative interviewing and methods.

Requirements analyses

In requirements analyses, interview insights can help to inform design—in particular, using interviews with one’s target audience to iterate on the design and functionality of digital tools. Nelson & Mateas (Nelson and Mateas 2009) provide game design assistance tools to several groups of game designers with various needs, perform interviews with them about their needs and how they can use the tools provided to help with those needs, and iterate on the tool’s design based on the results of these interviews. Grow’s (Grow et al. 2014)

approach to evaluating AI architecture authoring tools is similar, using three different case studies to evaluate three different architectures, and looking at how different architectures require different methods of authoring. Gustafsson, Holme, and Mackay analyze the play experiences and players' stories of important objects from their play using interviews and questionnaires. Analyses of these stories are used in order to inform the design of new game architectures that provide a greater support for player narratives (Gustafsson et al. 2020). This paper also draws on the tradition of other papers that use qualitative interviews, such as (Reyes 2018) and (Strugnell et al. 2018).

METHODS

In order to give GMs a baseline from which we could discuss the design and functionality of a TTRPG digital assistant, we created an example prototype that had some of the features that we were interested in assessing. Our goal for the digital assistant is to create a tool that can help GMs brainstorm what can happen next and keep track of player progress in the story, as well as connections between various story threads. In order to model how such a tool might work, we chose an example scenario to model and built out a potential visualization. We chose to model a specific scenario as a way of providing a quick and grounded demonstration of how technology can be applied to TTRPGs, but the lessons learned from this can be generalized and applied to more systems-agnostic designs for TTRPG support. The scenario we chose was *Lost Mine of Phandelver*, a scenario that comes with the *Dungeons & Dragons* 5th edition Starter Set (*D&D starter set* 2014), chosen because it is a scenario meant for new GMs using a popular TTRPG system, and thus could be the introduction to GMing for many new GMs. For modeling out the scenario, we focused on Parts 2 and 3 of *Lost Mine* because these offered some interesting variance in play style (social, hub-based quests and combat) and player options (multiple paths to the players' goal). We could then use this module as a common reference during interviews with GMs.

Lost Mine synopsis

Lost Mine of Phandelver (hereafter referred to as *Lost Mine*) (*D&D starter set* 2014) is a beginner module for *Dungeons & Dragons* 5th edition which includes information for a four-part adventure, including both elements of the story and characters as well as advice for GMs running the game. Here we describe some of the story information offered in the module to provide context for the interviews about *Lost Mine* described below. This does provide spoilers for the first three parts of the module. In *Lost Mine*, the players are tasked with seeking out the titular *Lost Mine of Phandelver* for Gundren Rockseeker, who goes missing at the start of the module. In order to find the kidnapped Gundren Rockseeker or the entrance to the lost mine, the players make their way to the town of Phandalin, where they learn that the townspeople are being harassed by a gang, the Redbrands. The players can find various leads in Phandalin that they can use to move forward, and they can also confront and stop the Redbrands. From there, players can leave town to either free Gundren Rockseeker and have him lead them to the mine, or find someone else who may know the mine's location.

Requirements analysis interviews

We used similar methods to our previous study (Acharya et al. 2021), interviewing six of the GMs included in that study as well as two more found based on convenience sampling

Category	Example questions
Preparation/Recording	What are some of the ways that you would prepare for running this scenario?
Preparation/Recording	How would you handle keeping track of player progress and what has happened so far?
Players Getting Necessary Info	What happens if players don't want to go to Phandalin, which prevents them from getting leads on how to find Wave Echo Cave?
Players Getting Necessary Info	What if players burn their bridges with possible sources of info about how to get to Wave Echo Cave (Gundren, Agatha, Hamun)?
Skipping Content	What happens if players do not have enough experience by the time they get to Wave Echo Cave?
Using Player Choices During Play	How do/would you incorporate the players' character info, backstory, etc. into the game?
Using Player Choices During Play	What would you change based on the choices the players make? What's an example of this?
Digital Prototype	In what ways do you think this digital assistant would be useful? What would you use it for?
Digital Prototype	What would you change about the existing digital assistant?

Table 1: Examples of interview questions and the category of each question

(Robinson 2014) from a pool of students and faculty members in the area. For the interview process, as with similar requirements analyses, GMs serve as both experts in this area and design partners. Before the interview, we asked GMs to review the module *Lost Mine*. We then conducted hour-long semi-structured interviews with each GM individually to get insights into their GMing process and how a digital assistant could help with this. For the interview, GMs were given a PDF version of the *Lost Mine of Phandelver* module, as well as links to both the static and interactive versions of the digital prototype, and could freely review and manipulate them during the interview. We both asked questions related to how the GM would run the module and questions related to the digital prototype—the information being displayed, how it might be helpful, and what the GMs would want to see changed about it. A table of some of the categories of questions and example questions in that category can be seen in Table 1. In some cases we followed up with GMs asking more specific questions, or asking for specific examples.

As with our previous study (Acharya et al. 2021), we then performed qualitative coding as informed by (Saldaña 2015) on the interview notes and video interviews. We developed a list of codes based on this interview analysis, adding a new one to the list whenever a topic or process arose that had not previously been mentioned. We also marked specific examples that GMs brought up during the interviews, both about how they would run *Lost Mine* and what they would want to see out of a GM digital assistant. After a first cycle of qualitative coding, we performed a second round of coding to develop broader categories and themes that arose in the interviews. We provide an example of some of the codes and

Category	Code	Example
Planning game	Incorporating player choice	Drawing on character sheet material, esp. character secrets or fears
Planning game	Incorporating player choice	Creating “interesting character moments” that test characters and push story forward
Requirements analysis	Recommendations for digital assistant	Ability to swap around story information without introducing unnecessary complications
Requirements analysis	Recommendations for digital assistant	Allowing GMs to add tags to associate information such as people and locations
Running game	Cutting content	Removing large number of factions (they drive focus away from main story)
Running game	Cutting content	Having fewer NPCs starting in Phandalin to reduce information overload

Table 2: Sample of categories, codes, and examples from interviews and online advice

categories we found in Table 2. Like (Gustafsson et al. 2020), we also use a triangulation approach (Mackay and Fayard 1997) that draws on multiple sources for analysis, combining our interviews with other sources on advice for GMing *Lost Mine* found online, allowing us to balance the trade-offs of different methodological approaches.

Analysis of online advice for GMs running *Lost Mine*

While the GM interviews are helpful for getting in-depth feedback about both how GMs run their games and getting feedback on the prototype that we created, we also examined online advice for GMing *Lost Mine*. This provided more information from a greater number of individuals, as well as experiences from individuals who have already played the module and can talk about the problems they faced. This also allowed us to see more of the questions, problems, and experiences that beginner GMs had when running the module.

We examined advice from online blogs and forums, looking at the first 20 relevant pages of questions and comments in searching for advice on running *Lost Mine*, as well as searching within specific communities for discussing GMing. Our information is pulled primarily from online communities r/DMAcademy (*r/DMAcademy*), r/DnDNext (*r/dndnext*), r/DnD (*r/DnD*), as well as a collection of other blogs and forums that discuss running *Lost Mine*. If the online advice thread linked to another resource for helping run the game, we looked at this new page as well. To examine the results, we took the codes generated during the

interview process and categorized the online advice into these areas. Whenever we had a piece of advice that did not fit any given code, we created a new code to represent this. These pages contain information from around 260 different GMs, but we capture and code the advice from around 35 commenters, not including comments that repeat ideas that have already been discussed or that do not contribute advice.

Creating a digital prototype

The prototype we developed is primarily focused on knowledge visualisation, depicting the connections between characters, locations, and information, and their connections to various plot threads in the story. This choice to focus on knowledge visualization is informed by the results of our previous study on GMing techniques for improvisational storytelling (Acharya et al. 2021). Information about each of the game’s entities is stored in a DataScript (Tonsky) database. As users query the database, results are visualized using the Javascript-based diagramming tool Mermaid (Sveidqvist).

We created several visualization styles: expanded, condensed and character-centric. The expanded style is a graph depicting locations, characters, and quest information, all appropriately linked. The condensed style is a graph focusing on quest information and characters, foregrounding progression of story threads. Finally, the character-centric style is a table listing all the characters, including information such as alive/dead status, occupation, faction affiliation, and relationship to other NPCs.

In the expanded version, all locations, characters, and information are depicted as separate nodes connected to one another. In the condensed version (Figure 1), information and characters are represented primarily in nodes that display the character and the information that they have together in one node. Nodes are colored according to which story threads they progress—contributing to having the players defeat the Redbrands (red), reach Cragmaw Castle (yellow), or find Wave Echo Cave (blue). In some cases, information contributed to both finding Cragmaw Castle or finding Wave Echo Cave (colored green). Finally, a third visualization lists the various characters in the module and information about them, including whether or not they are alive, their occupation and faction affiliations, and their relationships to other NPCs (friends, family).

INSIGHTS FROM GM INTERVIEWS

We analyzed notes and screen recordings of each interview (taken with the interviewee’s permission). Below we describe the findings from this analysis.

GM techniques for preparing for and running module

One area we were interested in examining is techniques that GMs use to prepare and run games, using a specific module to provide common ground between GMs.

Breaking up the module

Several of the expert GMs (2, 4, 5), stated that if they were to run *Lost Mine*, they might start with some of the material in the module as a basis, but would drastically alter the material to suit the kind of game they would like to run, using language such as wanting to “tear [the

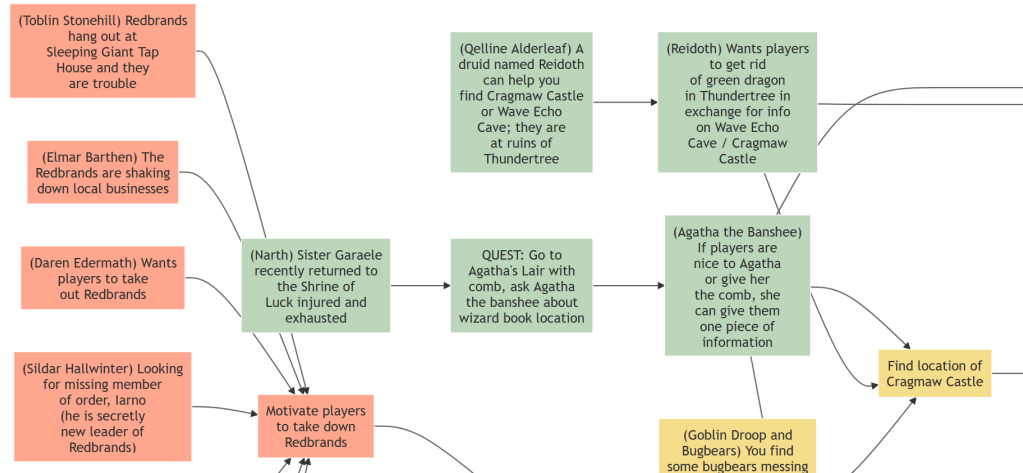


Figure 1: A section of the condensed knowledge visualization, where different colors indicate different story threads.

module] apart dramatically,” (2) or “cut[ting]... up” (4) the material. Along with this, these GMs stated that this kind of module is not something that they would normally run, with GMs #4 and #5 preferring to run more “sandboxy” games (5) with a large amount of player freedom and with GM #2 preferring to create their own game materials with close ties to the player characters.

Incorporating player choice and consequences

GMs discussed wanting to incorporate players into the story as they ran the game. One way in which they do this is through the character creation process. GM #3 particularly emphasized the importance of creating material that was “reflective” of players, both reflecting on who the players chose to play (the player’s characters) and the players themselves to “maximize emotional engagement.” Many of the techniques that GMs discussed for incorporating the players in the game during the character creation process aimed to establish strong connections between the characters being created and the story—whether this be specific events that could happen, or ties to larger story arcs. GMs #2, 4, 6, and 7 discussed creating “hooks” in the game that would tie to specific part of the player characters’ backstories or tailoring the material in the module to fit to what the players might want to see, with the character sheet and choices in character creation helping to expose to the GM what is interesting to players and what they might want to see in the game. For instance, if a player chooses to play a dwarf character they might have ties to the module’s Rockseeker family, or if a player is choosing to play a wizard interested in collecting spellbooks, dropping more hints that the Redbrand leader is a wizard that may have a spellbook worth acquiring (6). GM #3 discusses creating interesting emotional moments for players by having the players create dark secrets that they want to hide, such as the player characters’ connections to the villain, to make for interesting reveals and player suspicion that can arise during play. GM #2 discusses the “inherent challenge” with the module that the materials aren’t tied to the player characters in any way (since it’s a prewritten scenario) and it is thus “lacking the interesting part” of the game. They discussed how they would create interesting character moments for players based on the things that the player has said their character struggles

with, or forcing the players to choose whether to trust a character who has betrayed them in the past. Regardless of the players' choice as to how to deal with the situation, thus creates an "interesting character moment" that allows the story to still continue regardless of the result, which means that the GM doesn't have to deal with many possible story branches (2).

Player choice is also important during play. GMs (1, 6) discussed wanting to give players various choices of paths to pursue without making them feel "bogged down" (6) by having too many options. GM #2 discussed how player actions along one path could affect another—for instance, if the players clear the dragon out of Thundertree, perhaps another group of enemies like the Redbrands can take it over—with removed threats becoming "resource[s]" for other groups to use. GMs #4 and #6 discussed providing "narrative escalation" (4) depending on player choices: if players choose not to deal with a specific group, such as the Redbrands, things may escalate—the group may become more powerful with time, or satisfy their goals unhindered. GM #6 discusses this in plain terms—the villains will not just be in a room waiting for the players to come kill them; they will be doing things in the meantime. GM #4 states that player intervention or not—that is, both cases—should lead to something fun for the players and the GM.

One area that GMs (2, 4, 5) emphasized in their interviews was allowing one of the consequences of player actions to be failure. Rather than each encounter having a "foregone conclusion" (2) of the players succeeding, failure—for instance, the players being defeated or captured—should be a possibility. GM #5 discusses the importance of allowing players to "fail forward"—for instance, if they are trying to get information and fail a roll, they may still get that information, but there will be some cost or consequence as a result. This way, the story continues to move forward instead of an uninteresting result of nothing happening.

Requirements analysis for the digital assistant

Here we discuss findings from our interviews based on GMs' discussions of our digital prototype.

Information visualization

Overall, GMs commented that they liked the tool and were interested in the potential for computational tools to help with GMing. Many of the GMs liked that the tool condenses the many pages of information found in the module into a more accessible form that can be referenced in either planning for a next session or during play. GMs also talked about how the tool could be used to keep track of information, such as information the players know, or things that they have done, which could be used to help map out the rest of the story and determine effects from previous player actions.

That said, GMs had many recommendations for improvements and features that they would like to see. One area that GMs wanted to see improved was displaying more information on important relationships in the game. The current prototype has some limited information on NPCs—names, occupations, and a few relationship indicators such as whether characters are family members—but GMs discussed more features that they would like to see, and different layouts that they might find more helpful. Several GMs (1, 2, 5) talked about having more

information and linking between different information as well as a filtering/sorting feature to allow GMs to easily find the information they want and spot interesting connections that they can bring to the fore when preparing for or running their games. For example, if an NPC is in a given faction, GM #1 would like to be able to quickly see who else is in that faction, if the NPC is friends with anyone else in the faction, and other interesting relationships for that character. GM #2 added that they would also like to keep track of faction goals—what members of the factions want, and the next steps that they will take to accomplish this. They also wanted more of this information for NPCs, seeing the arc that the character is going through and what they might do next. This helps to drive the story based around the characters and their motivations.

Other places where filterable lists and other group information could be helpful is in displaying information about certain locations, events, or quests. GM #7 talked about using the story visualization to be able to see interesting things that can happen when the players get to a certain location, for instance encounters that can take place there. Being able to spatialize the information (for instance, seeing everyone who is at the inn together in one place) was also important to GM #4. Some suggested a tag system (4, 5) could help provide more flexibility and help GMs customize the information that they can see.

Some GMs also pointed out improvements to the current story visualization and changes they would like to see here. Interviewee #3 discussed other connections that could be drawn between the nodes in the story information graph, and suggested that each nodes should have multiple ways along which the player could move so that the game is less linear, and doesn't require players to take any one prescriptive path.

Finally, GMs discussed the importance of such information visualization integrating into their current workflow. Some GMs asked that the tool be compatible with existing tools like virtual tabletop platforms, while others wanted access to a non-digital version, such as printable versions of the flowcharts.

Generative computation and co-creativity

While information visualization was a big area that GMs talked about wanting supported and one that was heavily featured in the prototype of the tool, GMs also talked about other uses for computation in supporting GMing. One such area was in improvisation support and generating content for play. One of the main areas that GMs wanted support for was in being able to swap around existing content or add their own content, which was partially supported by the current prototype. Some of this was based on tailoring content to players. For example, GMs #2, 4, and 6 talked about curating content that was provided in the module and swapping elements to help create player investment—for example, if a player character's backstory states that they dislike earth elementals, swapping in a generic encounter with them (2). This might also involve altering content based on the kinds of encounters that are effective with certain players, or to create certain themes throughout the game (4). Swapping content can also be helpful changing content around if needed to help advance the story. GM #6 gives an example of this from *Lost Mine*—if Hamun the necromancer has information that you want the players to know but they decide they don't want to pursue that route, you can provide that information on another NPC, for example having the players find this information after defeating Iarno, the leader of the Redbrands

(6).

One way that this content swapping could be facilitated using computational tools is by allowing GMs to manually change information around. It might also be interesting to see how this computational support could be automatically generated or suggested—for example, providing an easier interface for GMs to input the changes they want to make and having this update automatically, or providing suggestions for changes that could be made to the scenario to make the game more tailored to the player’s backstory, theme, or what players might want to see. As GM #1 points out, swapping things around arbitrarily could lead to more complications down the line—for instance, if swapping out something related to a significant character or event, the GM has to make sure that all of the information that they still need to pass on to players gets passed on, and that everything still makes sense within the context of the story. Here, too, there is the possibility of having some kind of computational support, either suggesting swaps that make sense or smoothing out some of the complications that might happen as GMs make changes to the module and information.

Another area that GMs mentioned for creating new content for games was in random or procedural generation. When running games, GMs have material to pull from, but also come up with all sorts of “off the cuff” content as suit the needs of the game, which add color and variety to the world. Interviewee #1 talks about wanting to have a tool to help create information about a town, for example creating a random shopkeeper and having a randomizer to help the GM to determine what the shopkeeper is like, tone of voice, personality type, or providing improv cues for the GM (1). They also describe providing some constraints on that random generation so that the generated shopkeeper, for example generating shopkeepers of a given race commonly found in the town. GM #7 also talked about having an NPC generator provide plot hooks that an NPC can offer or unique items that make that NPC more interesting to the players, and stated that this could be useful if they were in a rut as a GM, or needed something to help motivate the players.

Another area in which GM #1 talked about creating new content for the game was in helping realize character and faction beliefs in the game. For example, if the general of a faction has the belief that the best defense is a good offense, how is this behavior contextualized and seen during play? GM #1 discusses how it might be nice to have some provided framing questions in order to help them better establish the kinds of actions that groups would take in the world to convey their beliefs. They offer the example of having the tool prompt the GM with questions—for example, how the given faction might take a fort (by force, by coercion, by stealth, etc.) or if the town was taken over by a tyrannical leader, how a member of the faction might deal with that.

Finally, GMs (5, 6) also talk about having improv prompts for things that can happen next. GM #6 discussed how this would be good for beginners, especially for modules that are large, expansive worlds (the GM gives the example of *Storm King’s Thunder* (Storm King’s Thunder 2016)). In such games, there is a lot of content, but at any one time players (and the GM) might be at a loss for what to do next, and there may be large distances (either physically or narratively) between each chapter of the story, with player potentially missing the plot hooks connecting them (6). Potentially, a computational system with some knowledge of what has already happened and story threads could provide prompts for potential events that

could happen next, or stepping stones to help guide players to the next part of the story.

INSIGHTS FROM ONLINE ADVICE FOR GMING *LOST MINE*

Overall, advice from online sources was largely consistent with the advice that arose during our interviews. Advice mostly fit into the existing codes, though we added three new codes—one for game difficulty (making sure that sections were not too difficult for players), one for theme (advice for GMs wanting to re-theme the module), and one for keeping the party together (making sure that player characters don't all wander off on their own). For the information that matched with previous codes, we found largely confirmatory advice and techniques pertaining to preparing for and running a TTRPG, including incorporating players into the story, setting up characters and encounters, improvisation, and examples of play from GMs' own games. Below, we discuss our findings from analyzing online advice and the common themes that arose from this advice pertaining to preparing for and running the module with a focus on GM-facilitated storytelling.

Tailoring content to players

As in our interviews, online advice in running *Lost Mine* suggested ways that GMs could tailor the module's content to the player characters. While the GMs in our interviews largely discussed having players create their own characters and backstories and how they would incorporate them, online advice predominantly suggests that new GMs provide players with premade character sheets, a list of suggested characters with some prewritten information about each character. This is because the premade characters already have some integration with the story provided in the module, and GMs can draw on these existing connections to make the players feel more like the story is about them, rather than the story being a generic one in which they just happen to be the main characters (Ereedmas 2018) (Shea 2018).

Like the interviewees, GMs online discussed a number of ways of integrating players into the story, using many of the same techniques as discussed in the interviews. One such example is tying player characters into the story by coming up with connections between the characters and existing content, or changing existing content to better fit with the player characters' backstories and motivations (DrHuggies 2019). For instance, one of the player characters could be related to the Rockseeker brothers, could be a former member of the Redbrands, or could owe a favor to someone in the town of Phandalin. Tying the player characters' histories in with the world "makes [the players] feel connected to the world and more invested in your story" (Koga305 2015).

Tying player characters into the game can also make for some powerful moments during encounters. One way of doing this is providing encounters that the player characters can excel at; one GM provides examples of this, such as "hordes of undead for the cleric to turn, preferred enemies for the ranger, lots of arrows for the monk to deflect" (DrHuggies 2019). But this can also be used to enhance dramatic moments during gameplay. One GM provides an example of this, where the player characters encounter a nothic, a monster in the Redbrand hideout capable of sensing the secrets of others through telepathy (*D&D starter set* 2014). When the players encountered the nothic, "they each heard a voice in the backs of their minds, reminding them each of their biggest mistakes or regrets" (RokenSkrow 2018), which the GM took from the backstories of each character. Another GM suggested

using character information to appeal to (and possibly trick) players during negotiations by promising to give the players what they want, based on the desires of the player characters. This specificity makes “the game so much more memorable,” according to one GM’s advice (DrHuggies 2019).

Developing characters

As in the interviews, developing characters and their ties to the world was important to GMs in advice found online. One area that GMs discuss is creating memorable and intelligent villains for the players to go against. For example, the main antagonist pulling the strings behind many of the encounters the players face, the Black Spider, doesn’t as-written have much in the way of personality or motivation (Conrad500 2018). As one GM puts it, “he is one of the flattest villains I’ve seen in any form of media” (*r/dndnext - Tips for Dming lost mines of phandelver* 2019). The encounter with the Black Spider as provided by the module is also not that interesting or challenging for players, leading to what could be an anti-climactic ending to the campaign. One GM suggests making this encounter more interesting for players by having the Black Spider set up traps or illusions for the players before the players arrive to make the fight more interesting (*r/dndnext - Tips for Dming lost mines of phandelver* 2019). Another GM suggests having the Black Spider be one of the citizens of Phandalin, perhaps who the players mistrust (RokenSkrow 2018), so that they are placed within the world and not just revealed later.

NPC motivations can be used to enhance encounters in the game. One GM states that “The majority of the enemies players will face are semi-intelligent humanoids, capable of being deceived, persuaded, or bargained with, so I would reward parties that come up with more nuanced solutions than hacking and slashing their way through every dungeon” (Conrad500 2018). This means that different enemies might behave in different ways depending on the encounter—for example, “wolves will team up to attack single characters, making use of their Pack Tactics ability, while Goblins will act as mobile skirmishers who run and hide after attacking” (Koga305 2016), making for more varied and interesting challenges for players.

Cutting content

Much of the advice that GMs offered in regards to preparing for and running the game involved drastically cutting the amount of content for the game. The module provides a lot of content which might be overwhelming for new GMs—because of this, one GM “recom-
mend[s] imposing LIMITS over imposing guidelines” by having GMs limit themselves to only a few interesting facts per NPC, limiting locations to only 1-2 interesting points per location then letting players explore them, only preparing content for the next session of the game, and limiting the total number of sessions played (KingKyle27 2018).

The module itself presents many side-quests that the players can pursue in Parts 2 and 3 of the module, and one GM suggests to new GMs to “[c]ut whatever you don’t need,” because “Phandalin is huge for a first time DM” (RokenSkrow 2018). For example, GMs recommended cutting down on the faction offerings in the game—there are many factions that the players can join, but doing this has little significance and can cause players to lose focus on the main story (RokenSkrow 2018) (sundforn 2018).

Player consequences and improvisation

During our interviews, GMs discussed incorporating player consequences and improvising around player actions. Several online comments also emphasize the importance of improvisation, noting that the source material is a “suggestion” (KingKyle27 2018) for things that could happen, but if GMs had ideas for things they wanted to change, they should change them (InsecureYeti 2016).

There are different ways that improvisation can be used throughout the module. One GM discusses techniques similar to those discussed by our interviewees, describing the module as “a series of small sandboxes stacked together” (Shea 2018). As players travel in and between these sandboxes, they have different choices they can make and different paths to traverse, rather than constraining the players to one path. Improvisation can also focus on coming up with new content based on the consequences of players’ actions, for instance signalling to the players the horrors of failure: “Glasstaff gets away? His mutilated body is found hanging from the ceiling of the inn” (*r/dndnext - Tips for Dming lost mines of phandelver* 2019). This improvised world interaction can also be used to reward players for clever thinking, leading players to feel that they “are truly affecting the story and world” (Ereedmas 2018).

Dealing with the green dragon

One discussion that arose quite commonly (RokenSkrow 2018) (sundforr 2018) but didn’t come up during our interviews was a discussion of the green dragon encounter at Thundertree. Many GMs found that during play, this scenario was particularly difficult to plan around and execute. The encounter itself pits the players against a young green dragon, which if resulting in combat is likely a deadly encounter for the relatively low-level player characters.

GMs had several suggestions for altering this encounter to help address some of these issues. One suggestion GMs had was properly signposting the difficulty of the encounter with the green dragon, for instance through showing dead creatures in the area around the green dragon’s lair, or providing rumors of the dangers in town (*r/dndnext - Tips for Dming lost mines of phandelver* 2019). GMs could also provide a way for the party to be defeated by the green dragon without being killed, for instance having the dragon spare the party to use them as minions (RokenSkrow 2018).

SPECULATIVE DESIGNS FOR A GM DIGITAL ASSISTANT

From the results of this interview study, as well as our previous study on story improvisation in TTRPGs (Acharya et al. 2021), we have identified two possible design directions for future computational assistants for GMs.

Information tracking and story management

The first design direction involves continued development of the information tracking and visualization we included in our requirements elicitation prototype. GMs found this information tracking and organization helpful, and asked for more features along these lines allowing them to rewrite and reorganize information, keep track of what players have done

so far using the tool, and possibly also use the tool alongside players to track what it is that players know and are interested in. Based on the interviews, this would likely be something that is done between sessions—perhaps as a GM is planning out their game, or planning for the next session and wanting to reference information that players know and the choices that they have previously made, as GMs were worried about the time that it would take to update the tool during play, and already had a lot to manage in running their games. GMs also talked about how this might fit in with other supplemental digital material that might be offered with the game—one could see, for instance, a module being sold with a searchable, visualizable database of the core information in the module that the GMs can reference and alter during play. GMs also discussed wanting more of a visual representation of relationships between NPCs and factions.

From a usability perspective, the current tool is difficult for GMs to use to modify information easily. The flowchart view was helpful for showing condensed information, but having it more visually clear what information can be swapped out or changed—for instance, an NPC name having a distinct border around it that all NPC names have that can be easily swapped in or changed, would make it clearer what can be modified and how the user can do it. GMs should also be able to use a similar drag-drop interface to designate and change connections between nodes as needed.

While GMs usually describe writing their own notes for what happened after a session, another route for recording what happened during a session is having this be a collaboration between the players and the GM. This could either entail the players adding what they know using the tool, or describing what they have done and having the GM update the tool based on this (for instance by adding/modifying nodes, or revealing nodes to players on a player-facing version of the screen). By having the player collaborate in updating the tool, this highlights for the GM what content was important for the players.

Improvisational assistant

The second design direction is support for story improvisation. This would be primarily tailored towards novice GMs, as expert GMs tend to actively enjoy the challenge of improvisation while novice GMs find it stressful and difficult, as found in earlier qualitative interview work (Acharya et al. 2021). This computationally assisted improvisation can be informed by the techniques that expert GMs use in their own games.

One feature that GMs said would be helpful is random and procedural content generation. For example, if the GM needs to quickly come up with a new character or location such as a shop with a shopkeeper that the players visit, the tool could help generate this content. For helping the GM progress plot threads when the players behave in unexpected ways, the tool can use information about how far various plot threads have been progressed, to offer the GM choices of plot hooks to use to reengage the various threads.

Because GMs also talked about the importance of NPCs and factions having their own intentions and actions that they want to take in the world, it's possible that this could be used to help inform some of the suggestions for what happens next and consequences for player actions. For example, if the players choose to pursue a certain route while ignoring another, or choose to avoid dealing with something that could become a threat, part of the suggested

improvisation the tool provides could be an example of the ramifications of that choice. This would need to be based around some system knowledge of what it is that the various factions or characters want to do, and knowledge of the actions that they could take in order to satisfy their goals, similar to existing story planning (Riedl and Bulitko 2013). Suggestions could also be pulled from a social simulation that could provide interesting emergent suggestions to help support GM creativity, based on the existing characters and game world.

CONCLUSIONS AND FUTURE WORK

We believe that this analysis of interviews and online advice for GMs is a strong starting point for understanding how we can better design computational assistive tools for GMs. Next steps for this work likely include building out some of these speculative designs as actual functioning tools that GMs can use. While the prototypes presented in these interviews featured some of the functionality that we were interested in testing, building out better systems to test (either via a Wizard-of-Oz study or by having the users interact with an actual system) would be even more helpful in assessing what works for GMs and any changes that they might want to see in such a tool, particularly using a more targeted demographic, such as beginner GMs. It could also be helpful to look at GMing in practice by observing play sessions, both of typical TTRPG play and more experimental play, such as the GM trying to run a game in which the players actively work against them. We hope to see future work that continues to explore the space of TTRPGs and collaborative storytelling.

BIBLIOGRAPHY

- Acharya, Devi, Michael Mateas, and Noah Wardrip-Fruin. 2021. "Story improvisation in tabletop roleplaying games: Towards a computational assistant for game masters." In *2021 IEEE Conference on Games (CoG)*, 01–08. IEEE.
- Bergström, Karl. 2011. "Framing storytelling with games." In *International Conference on Interactive Digital Storytelling*, 170–181. Springer.
- Conrad500. 2018. *r/mattcolville - So you want to run Phandelver? (A guide for new and experienced DMs)[spoilers]*. https://www.reddit.com/r/mattcolville/comments/91krkp/so_you_want_to_run_phandelver_a_guide_for_new_and/.
- Cover, Jennifer Grouling. 2014. *The creation of narrative in tabletop role-playing games*. McFarland.
- D&D starter set*. 2014. Wizards of the Coast.
- DrHuggies. 2019. *r/DMAcademy - New DM running lost mine of phandelver*. https://www.reddit.com/r/DMAcademy/comments/bc5ero/new_dm_running_lost_mine_of_phandelver/.
- Ereedmas. 2018. *r/DnD - Tips for new DM running Lost Mine Of Phandelver*. https://www.reddit.com/r/DnD/comments/8tjnjb/tips_for_new_dm_running_lost_mine_of_phandelver/.

- Flowers, Amanda, Brian Magerko, and Punya Mishra. 2006. "Gamemasters and interactive story: A categorization of storytelling techniques in live roleplaying." *Futureplay, London, Ontario*.
- Grow, April, Swen Gaudl, Paulo Gomes, Michael Mateas, and Noah Wardrip-Fruin. 2014. "A Methodology for Requirements Analysis of AI Architecture Authoring Tools." *Proceedings of the 9th International Conference on the Foundations of Digital Games*, <https://games.soe.ucsc.edu/methodology-requirements-analysis-ai-architecture-authoring-tools>.
- Gustafsson, Viktor, Benjamin Holme, and Wendy E Mackay. 2020. "Narrative Substrates: Reifying and Managing Emergent Narratives in Persistent Game Worlds." In *International Conference on the Foundations of Digital Games*, 1–12.
- Horswill, Ian. 2019. "Imaginarium: A Tool for Casual Constraint-Based PCG."
- InsecureYeti. 2016. *r/dndnext - Lost mine of phandelver*. https://www.reddit.com/r/dndnext/comments/4ass6w/lost_mine_of_phandelver/.
- KingKyle27. 2018. *r/DMAcademy - Tips for Lost Mines of Phandelver*. https://www.reddit.com/r/DMAcademy/comments/993qc6/tips_for_lost_mines_of_phandelver/.
- Koga305. 2015., May. <http://pactofthetome.blogspot.com/2015/05/getting-started-with-starter-set-part-2.html>.
- . 2016., January. <http://pactofthetome.blogspot.com/2016/01/getting-started-with-starter-set-part-3.html>.
- Mackay, Wendy E, and Anne-Laure Fayard. 1997. "HCI, natural science and design: a framework for triangulation across disciplines." In *Proceedings of the 2nd conference on Designing interactive systems: processes, practices, methods, and techniques*, 223–234.
- Nelson, Mark J., and Michael Mateas. 2009. "A requirements analysis for videogame design support tools." In *Proceedings of the 4th International Conference on Foundations of Digital Games - FDG '09*. New York, New York, USA: ACM Press.
- Peinado, Federico, and Pablo Gervás. 2004. "Transferring game mastering laws to interactive digital storytelling." In *International Conference on Technologies for Interactive Digital Storytelling and Entertainment*, 48–54. Springer.
- r/dndnext - Tips for Dming lost mines of phandelver*. 2019. https://www.reddit.com/r/dndnext/comments/a9b469/tips_for_dming_lost_mines_of_phandelver/.
- r/DMAcademy*. <https://www.reddit.com/r/DMAcademy/>. <https://www.reddit.com/r/DMAcademy/>.
- r/DnD*. <https://www.reddit.com/r/DnD/>. <https://www.reddit.com/r/DnD/>.
- r/dndnext*. <https://www.reddit.com/r/dndnext/>. <https://www.reddit.com/r/dndnext/>.

- Reyes, Maria Cecilia. 2018. "Measuring User Experience on Interactive Fiction in Cinematic Virtual Reality." In *Interactive Storytelling*, edited by Rebecca Rouse, Hartmut Koenitz, and Mads Haahr, 295–307. Cham: Springer International Publishing. ISBN: 978-3-030-04028-4.
- Riedl, Mark Owen, and Vadim Bulitko. 2013. "Interactive narrative: An intelligent systems approach." *AI Magazine* 34 (1): 67–67.
- Robinson, Oliver C. 2014. "Sampling in interview-based qualitative research: A theoretical and practical guide." *Qualitative research in psychology* 11 (1): 25–41.
- RokenSkrow. 2018. *r/DMAcademy - Advice on the Lost Mine of Phandelver!* https://www.reddit.com/r/DMAcademy/comments/9n1x8l/advice_on_the_lost_mine_of_phandelver/.
- Saldaña, Johnny. 2015. *The coding manual for qualitative researchers*. Sage.
- Shea, Mike. 2018. *Dungeons & Dragons Starter Set: Running Phandelver*, September. https://slyflourish.com/running_phandelver.html.
- Storm King's Thunder*. 2016. Wizards Of The Coast.
- Strugnell, Jonathan, Marsha Berry, Fabio Zambetta, and Stefan Greuter. 2018. "Narrative Improvisation: Simulating Game Master Choices." In *International Conference on Interactive Digital Storytelling*, 428–441. Springer.
- sundforr. 2018. *r/dndnext - Just finished Lost Mine of Phandelver - my tips for anyone running it*. https://www.reddit.com/r/dndnext/comments/8vn6x6/just_finished_lost_mine_of_phandelver_my_tips_for/.
- Sveidqvist, Knut. *Mermaid: Markdownish syntax for generating flowcharts, sequence diagrams, class diagrams, gantt charts and git graphs*. <https://mermaid-js.github.io/mermaid/>. <https://mermaid-js.github.io/mermaid/>.
- Tonsky. *Datascript*. <https://github.com/tonsky/datascript/>. https://github.com/tonsky/datascript.
- Tychsen, Anders, Michael Hitchens, Ruth Aylett, and Sandy Louchart. 2009. "Modeling Game Master-based story facilitation in multi-player Role-Playing Games." In *Proceedings of the 2009 AAAI Symposium on Intelligent Narrative Technologies II*, 24–32.