

THE GAME MASTER

Anders Tychsen
Macquarie University
Building E6A, 2109 North
Ryde, Sydney, NSW
Ph.: 0061 410768711
atychsen@ics.mq.edu.au

Michael Hitchens
Macquarie University
Building E6A, 2109
North Ryde, Sydney, NSW
Ph.: 0061 2 98509538
michaelh@comp.mq.edu.au

Thea Brolund
University of Technology
P.O. Box 123, 2007
Broadway, Sydney, NSW
Ph.: 0061 438539883
tbrolund@yahoo.dk

Manolya Kavakli
Macquarie University
Building E6A, 2109
North Ryde, Sydney, NSW
Ph.: 0061 2 98509572
manolya@ics.mq.edu.au

ABSTRACT

The concept of a Game Master (GM) is associated with a range of functions in role playing-based games, from pen and paper role playing games to live action-, computer- and massively multiplayer online role playing games. The functionality of the GM across game platforms is directly related to a handful of variables.

In spite of being a core concept in role playing games, the full range of tools provided to GMs have not been fully integrated across the game platforms. The introduction of GM functionality in multiplayer computer role playing games such as *Vampire the Masquerade: Redemption* and *Neverwinter Nights*, indicate a substantial potential for development of toolsets for human-controlled interactive, emergent storytelling environments in virtual worlds, at several levels of functionality. Giving control of the game world to the players encourages a dynamic form of storytelling in games which is more reactive, and tailored to the specific players, than what is currently possible using pre-programmed static narratives or automated storytelling engines.

Keywords

GM, role playing game, interactive narrative, emergence, dynamic, human control.

1. INTRODUCTION

In order to enhance the development of Computer Role Playing Games (CRPGs), it is relevant to study Pen and Paper-based Role Playing Games (PnP RPGs), and the mechanisms by which these work. This will uncover if PnP RPGs have anything they can contribute to CRPGs that they have not already.

In PnP RPGs, the Game Master (GM) [9, 14, 18] hold a major part of the game control, including, but not limited to, the development of the narrative. In this paper, a categorization of the functions of a GM, as they exist in various forms of RPGs across four platforms, is proposed and the basic implications for computer-based RPGs are outlined. The concept of the Game Master has come to be synonymous with a bewildering array of functions in contemporary gaming across several gaming platforms, from pen and paper (or table-top) role playing games, Live Action Role Playing Games (LARPs), text-based MUDs, to

multi-player CRPGs, some bordering on persistent-world games such as *Neverwinter Nights* (2000 Atari/Bioware) (Figure 1); to Massively Multiplayer Online Games (MMOGs). As one of the defining characteristics of traditional PnP RPGs, the **concept** of the GM has survived into the electronic realm of CRPGs. However, the **functions** associated with the GM vary to such extent that a GM in a MMOG or MMORPG such as *World of Warcraft* (2004 Blizzard (Vivendi Games)) is associated with features almost completely different from a GM in a traditional PnP RPG like *Dungeons & Dragons* (3.5th edition 2003, Wizards of the Coast) or *Call of Cthulhu* (2005 Chaosium).

In the few CRPGs where the GM has not been fully replaced by a game engine and a pre-determined, static narrative, several of the most vital functions associated with the GM in PnP RPGs have only been implemented to a limited extent. Examples include *Vampire the Masquerade: Redemption* (2000 Activision/Nihilistic Software), *WarCraft III* (2002 Blizzard Interactive (Vivendi Games)), *Dungeon Siege* (2001 Microsoft) and notably *Neverwinter Nights*. Even though the tools available to the GM (**GM toolkits**) (Figure 1) in these games are innovative, the generation of an environment where emergent, dynamic storytelling can take place using these toolkits, remains relatively complicated. This is because not all the tools available to GMs in PnP RPGs have been replicated with features capable of performing the same functions.

This paper provides a review and definition of the GM and the functions associated with the term in RPGs across four platforms. The success with which the GM functionality has been integrated into electronic games is evaluated. Venues for development of the functionality of GM toolkits in electronic games, focusing on CRPGs, leveraging the more than 30 years of experience in PnP RPG and LARPs, are outlined.

2. THE FUNCTIONS OF THE GM

The areas for which a GM can be responsible, regardless of the game platform (PnP RPG, LARP, CRPG or MMOG), vary not only internally in games from each platform but also across platforms. A GM in a MMOG generally has different responsibilities than a GM in a PnP RPG. These differences can be related to a limited number of variables, such as the media of expression. The full range of possible responsibilities of GMs can be subdivided into the following five categories, which also cover the functions of automated storytelling engines (Figure 2):

1) **Narrative flow:** Creating the scenario (pre-planned plot or environment that the game takes place in) or alternatively improvising the scenario on-the-fly, delivering narrative control through interacting with players, introducing new elements and resolving events. The GM is in charge of keeping the narrative flowing, providing dynamic feedback to the actions of the player avatars, using e.g. on-the-fly updates.

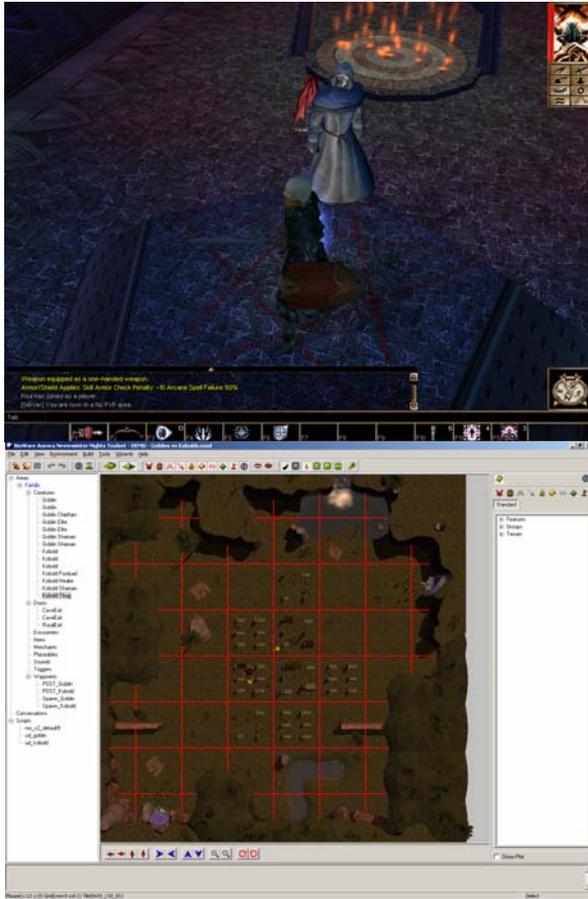


Figure 1: The Neverwinter Nights AURORA Engine and the supplied GM toolkit (top) and game environment (bottom).

The content and format of an RPG scenario varies substantially across RPG genres. In a PnP RPG the scenario can provide a blueprint for creating a highly controlled, linear narrative, or be merely a few NPCs tied together in an environment. LARP scenarios can likewise vary from detailed scripts of each participating character and any events that will take place during the game, to a loose association of GM-controlled NPCs in a fictional world setting. In CPRGs, the scenario is typically strictly pre-planned with few actual player choices, although the GM-control option in *Neverwinter Nights* allows for a more unrestrained approach. The primary difference between these forms appears to be in the amount of player freedom. GMs can choose to use physical handouts (e.g. maps) during the game, and theater-style props are often used inLARPs.

2) **Rules:** The GM is responsible for ensuring that all players know and understand the game rules, as well as enforcing these. Rules in RPGs are somewhat different from game rules in e.g. sports and traditional board games, due to the open-ended design. Instead of focusing on the interaction between the players and game goals, they focus on: 1) How the fictional world operates; 2) How the players interact with the fictional world and its inhabitants and: 3) How the players interact with each other and the GM. The first two of these categories can be roughly subdivided into “hard” and “soft” rules. Hard rules are those who deal with game mechanics

directly, e.g. how much damage a sword does, soft rules are the general features of the fictional world setting, e.g. that there is gravity. In computer games, the hard and soft rules are incorporated directly into the game engines. In PnP RPGs and LARPs, the GM can be responsible for creating the rules, if an existing RPG rules system is not used. The GM also arbitrates any conflicts which arise through the use of rules or rules-governed plot switches (applies rules on events to obtain outcomes).

3) **Engagement:** While entertainment in most RPGs is the responsibility of the players themselves, providing fun and tension is commonly a responsibility of GMs in PnP RPGs. To support engagement, the GM must present the events taking place in the game world, and facilitate communication flow between the players during the course of the game. Lastly, the GM must provide constant challenges in order to keep the game entertaining. This not necessarily by catering to every whim of the player, but making sure the players have a reason to continue playing, and in the case of group-based RPGs, keep functioning as a group.

4) **Environment:** In order to play, the players must have a fictional setting. This can be **perceived** (in case of PnP RPGs), **physical** (LARPs) or **virtual** (CRPGs and MMOGs). In essence, the GM creates the magical circle around the game [22]. Furthermore, the properties of this world must be communicated via the fictional contract, defined by [24] as: *The agreement between the players as to how the world fiction operates and what rules [that] govern it*”. The environment needs to be filled out with non-player controlled characters (NPCs), which include all forms of active agents (agents who can actively interact with the characters of the players, e.g. monsters, helping friends, citizens in a kingdom etc.). Environment responsibilities include providing and defining a physical game space in the case of LARPs.

5) **Virtual world:** In the case of CRPGs and MMOGs, the role of the GM can include responsibilities uniquely related to the virtually constructed game world. While the three functions provided under the Virtual world category could be placed under the other four categories (On-the-fly updating of game world under Narrative control; Community support under Engagement and Bug/exploit/farming control under Rules), virtual worlds have features that are not shared with perceived and physical game worlds, which is why they are treated as an individual category here. For example in MMOGs, GMs can be in charge of providing support to the player community, which can number in the millions (e.g. for *World of Warcraft* or *Lineage 2* (2004 NCSoft)). Furthermore, the GM provides an in-game police force, locating bugs, preventing players from exploiting bugs or farming in-game resources. Lastly, while only implemented in *Neverwinter Nights* and here only to a limited degree, to provide on-the-fly updates of the game world and the active agents, as required by the actions of the players and the narrative development.

3. THE ROLE OF THE GM IN PNP RPGS

PnP RPGs are inherently difficult to define, and remain the subject of intense debate in and out of academic circles [7,10-13]. A major reason being that RPGs do not fit traditional narrative models. In effect, there is no author-audience relationship as in e.g. films and books, which necessitates a new approach to narrative formation [12]. L. Padol [20] defined that

role playing games: “Allows people to become simultaneously both the artists who create a story and the audience who watches the story unfold. This story has the potential to become a personal myth, shaped to meet the needs of its creators.”

PnP RPGs are constructed of description/response cycles that are formed between the GM and the players. During play, the GM assumes a variety of responsibilities depending on game type and style of play, including the responsibility for providing information on the world setting and the development of the storyline as the game progresses. The narrative is refined through player queries, and the players use the input and environmental descriptions provided by the GM to construct individual perceived models of the events that are taking place in the game [17].

Traditionally, the GM has a live control over the game world and its inhabitants (NPCs, via whom the GM interacts with the players), and is responsible for providing an environment where emergent collaborative storytelling can take place, tailored to the specific group of players. The GM is the participant in the game with access to the greatest degree of information outside the shared play space. The GM acts as a

referee and defines the fictional world settings, as well as communicating and enforcing the fictional contract with the players [7,12,24]. The GM has access to and is normally involved in the character creation of the other players, and is in possession of the scenario or adventure module (the notes or storyboard that the GM uses to direct or create the story). The GM is a participant in the game, however, with the exception of a few RPGs focused on collaborative storytelling, e.g. some variations of the PnP RPG *Vampire the Masquerade* (VtM) (1992 White Wolf Games), is not a player.

In practice, the role of the GM varies significantly between PnP RPGs. Traditionally, the GM has the de facto power and say-so over everything within the magical circle [22] of the game, however, the GM exists via the acceptance of the players, and in some forms of PnP RPG play, in-game power is more distributed. In the latter case, the game can be run entirely without a GM, or has reduced the in-game power of the GM to that of a facilitator of the narrative without any deciding influence regarding the fictional world setting, or the development of the narrative [24].

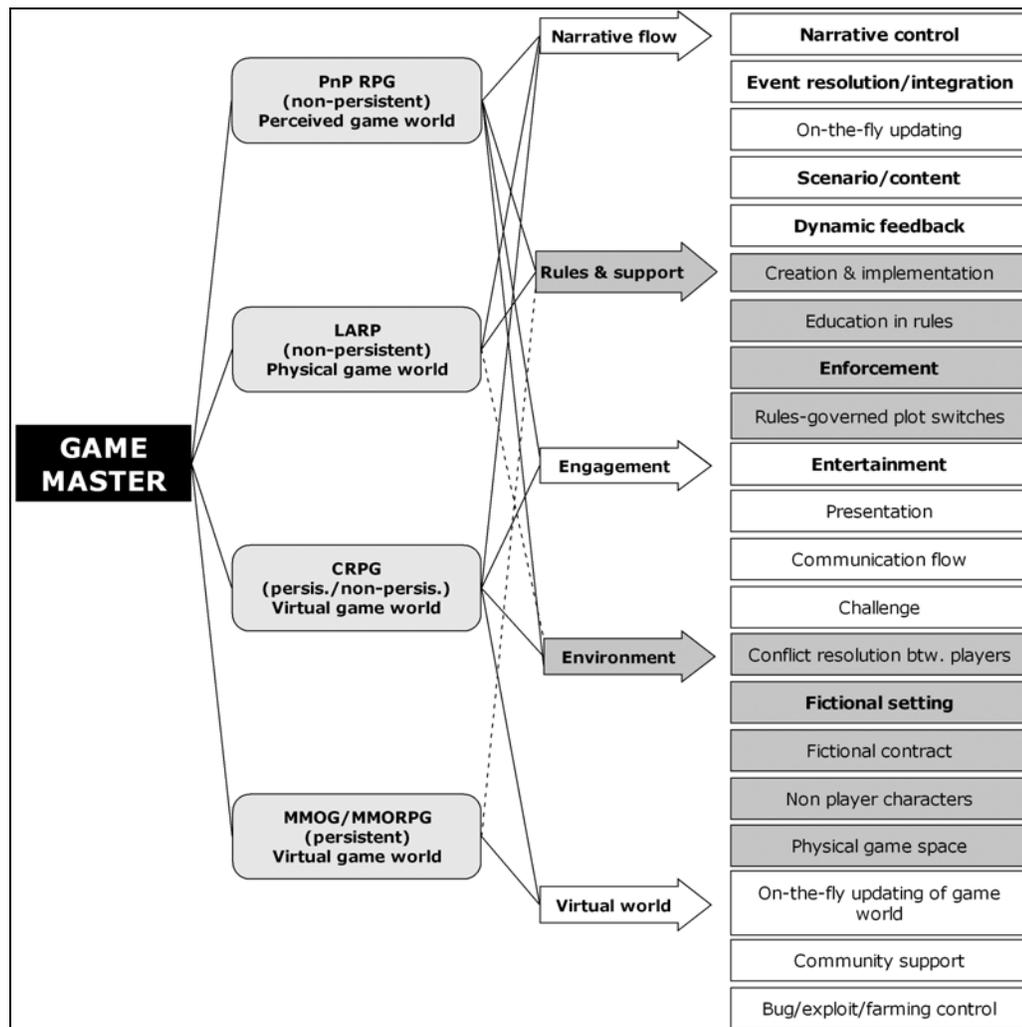


Figure 2: The GM (black) and the full spectrum of functions associated with different types of RPGs: PnP RPG, LARP, CRPG and MMOG (MMORPG) (grey with vertical white stripe). Each of the game type platforms are generally associated with a limited number of the displayed five core functions (Narrative flow (white), Rules (light grey), Engagement (middle grey), Environment (dark grey) and Virtual world (grey with lateral white stripe) associated with the GM function, e.g. GMs in LARPs are generally not responsible for generating a fictional environment (game world), because LARPs take place in a physical (real) space. Functions in bold represent GM functions that are the most common among RPGs on all four platforms, and which are of particular interest with respect to dynamic and interactive storytelling.

The game-specific term for the GM can vary between games. The variation can be an attempt to focus on aspects of the GMs role, or a style of play that is being emphasized. For example, the term Storyteller in VtM focuses on the function of the GM as a guide of a story which is told in cooperation between the players and the GM, and where rules play a subservient role.

During the 1990s, a gradual change in emphasis occurred, with regards to the role of the GM in PnP RPGs. Traditionally, the GM was defined as a storyteller and all-powerful in-game. However, aided by games such as VtM, delegating the GM to being a provider of plot hooks, circumstances and events to bring the characters into the story in a compelling way [5], gained wider acceptance. The thematic change emphasized narrative flow and quality as being more important than rules. The GM is in these situations responsible for providing plot hooks and combines these as the play progresses. In this kind of emergent environment, it is up to the players to select among the plot hooks and generate the story with a maximum amount of freedom. The role of the GM under this paradigm is thus comparable to that of an editor.

In practice, any combination of the two paradigms – the GM as the de facto master of the game to a provider of an emergent storytelling environment - can occur in RPG play. The differences usually necessitates that the distribution of power between the GM and the players is agreed upon prior to game start.

4. THE GM IN LIVE ACTION RPGS

Live Action Role Playing Games are based around the same core concepts as PnP RPGs, with however the major difference that the game is played in a physical game space, not a perceived one. This increases the level of immersion and the interactive capabilities of the participants, by having the players embody their characters. Game sessions can vary in length from a few hours to a week, with sessions possibly linked in long-lasting campaigns. In these large-scale LARPs, teams of GMs and NPC/contingency characters may use modern communication technologies to keep track of the unfolding narratives amidst the chaos of individual player actions. While running, a LARP is the closest equivalent to a MMOG, because of the persistent nature of the game and the sometimes massive amounts of participants: Up to 4,000 in England (the maximum number of participants recorded). The way stories are generated, controlled and told in LARPs is thus parallel to MMOGs.

The situation facing the GM (or GMs, organizers) in a LARP is described by H. Logas [15] when she wrote that being the GM in a LARP: *“Requires a Taoistic sense of calm and flexibility. Tightly controlling the game is out of the question. There are more players than in a table-top [role playing] game, and they will be running all over the place and having side conversations out of the [GM’s] ear-shot. It is very likely that many of the players will be completely random people, which make their actions very hard to predict. The story will occur in almost completely real-time, which is not only demanding on the storyteller but also adds to the [GM] not being able to easily keep on top of everything that is going on. Players in a LARP don’t wait until the [GM] is ready to deal with them. They keep right on playing.”* The GM is in other words forced to let go of the game and let it take on a life of its own outside his or her control. While based on similar principles, the requirements to GMs in a LARP is therefore very different in practice from GMs

in PnP RPGs. Following the model above, these can be summarized as follows:

Narrative flow: The GM is generally, unless the LARP is small in terms of number of participants, *not* responsible for keeping the narrative flow. The GM can however oversee the progress of the game and help or influence where needed, spread rumors and in similar ways attempt to control or influence the information flow in the game [e.g. 2,23].

Rules: The GM may or may not be responsible for enforcing the rules between the players, but not between the players and the environment. In most cases the GM will act as an arbiter if conflicts arise, however, this will is not a prerequisite. The GM can also be responsible of hunting down cheaters or other rule breakers.

Engagement: The GM is generally not – especially in open-ended and large scenarios - responsible for keeping players entertained, but can utilize in-game tools to entertain in specific situations. This includes solving certain types of conflicts between players. However, these responsibilities for entertainment usually lie within the province of the individual player or any NPCs that control sub-sections of the game in which the player is included (e.g. an army commander). Establishing a hierarchy of GMs and NPCs to monitor the game and ensure everyone is entertained and activated within the shared game space is a typical way of controlling large fantasy LARPs. This structure is usually established before the game commences.

Environment: The GM is in charge of defining the physical game space, and prepare the space according to the setting and theme. The GM is responsible for ensuring that any props or items used in the game can be clearly understood by all participants. The GM is however not responsible for the physical environment as such – it is up to the players to perceive it. The GM can also be responsible for creating characters, decide whether any events not created by the players are to take place and so forth. In most LARPs, the majority of the work of the GM takes place before the beginning of the game.

5. THE MEDIA TRANSITION

Several PnP RPGs have been turned into CRPGs and MMORPGs, including *Dungeons & Dragons*, and the computer role playing game platform is now arguably more popular than its pen and paper based counterpart.

CRPGs can be separated into single- and multiplayer categories, and furthermore those few who have incorporated a GM toolkit instead of a fully automated storytelling engine. Here focus will be on games from the first case, i.e. games with an actual live control function, not just the capacity to build new levels using a level editor or world builder as is seen in e.g. the *Unreal Tournament* (2000-2004 Atari) and *Quake* (1996-2005 Activision) series of 1st person single/ multi-player shooters. Multi-player CRPGs are superficially identical to PnP RPGs with the exception that CRPGs utilize a virtual world presented in a graphical user interface, while PnP RPGs rely on the imagination of the players to generate a fictional world inside their minds eye. The use of a virtual world is of both advantage and disadvantage. The advantage is that the players are provided an immediate representation of the game world. This alleviates a fundamental problem in PnP RPGs, that players perceive events through their individual minds eye, which can lead to confusion, for example about who is doing what during an encounter with opponents. The disadvantage is that the representation of the game

world hinders the formation of deeply personal visualizations in the individual minds eye of the players. Furthermore, current CRPGs do not have any genuine dynamic feedback capacity as that provided by a human GM.

The theoretical net effect of using a graphical interface relative to a perceived world have not been examined in depth or quantified to date. It is therefore not possible to come to a conclusion with regards to the net gain or loss of using a graphical interface at this stage. In practice, however, the use of a graphical interface is problematic due to technical limitations for example communication pathways: In PnP RPGs and LARPs all lines of normal human communication are available: Speech, Emotion and Body Language (Figure 3). In CRPGs and MMOGs, they become narrowed down due to technical limitations, albeit with the added feature of Scripting as a means of communications. Additionally, contemporary game engines do not allow for on-the-fly updating of the game world and generation of new content in reaction to the actions of the player-controlled avatars (or characters in PnP RPG terminology). If the players decide to open a door to a house in the game world, and the GM has not prepared for this possibility and therefore has not modeled the house interior, it will take time to do – thus interrupting the flow of the game.

Various solutions have been attempted to solve the problem of player to player communication placed by the limits of current animation technologies, notably the incorporation of emotes – animations of shrugs, kisses, laughs and similar displays of emotion that players can command their avatar to perform (Figure 3). Emotes are represented in most contemporary MMOGs and also in *Neverwinter Nights*. They are however limited in number and not as spontaneous or variable as human emotions. Body Language faces similar problems, and emotes have been employed as a partial solution – e.g. commands that cause avatars to shrug their shoulders or raise their fists in anger (e.g. *World of Warcraft*). Concerning speech, technologies are already in place to partly remedy this problem, although for most MMOGs and CRPGs third-party software normally has to be used, such as *Skype* or *Ventrilo*. Live-speak capability is therefore not a problem of technology, although it does place requirements on the bandwidth of the players in case of internet-based games.

6. THE GM IN COMPUTER RPGS

In theory, a human GM in CRPGs can have responsibilities that fall into as many possible categories as GMs in PnP RPGs, with the added responsibility of managing a virtual game world. In general, the game engine takes away most aspects of rules regulation which the GM no longer needs to spend resources on, allowing a greater focus on the narrative development. The high GM:player ratio in multi-player CRPGS, e.g. *Neverwinter Nights* where the player number is limited to 64, and the generally non-persistent nature of the games, provide a game framework that is overall more similar to PnP RPGs than to MMOGs. Although some *Neverwinter Nights* games have been running consistently over several months, they are generally shorter lived than a classical PnP RPG.

Rules: These are built into the game engine and the virtual world, meaning that the GM does not have to create, implement or enforce them, or be worried about solving player-player conflicts concerning the understanding of rules (although

players may still cause conflict regarding e.g. fairness of a given rule). Hard and soft rules form an integrated part of the game engine, and therefore are not possible to tweak or ignore on the fly to support the narrative development. However, the GM is still free to e.g. remove opponents if the avatars of the players are hurt, and the GM wants them to reach a given plot point more or less alive. The GM may also be charged with educating players in the game rules.

Narrative flow: In theory, a GM in a multi-player CRPG has the same narrative responsibilities as a GM in a PnP RPG. However, current GM toolkits restrict the communication lines available to the GM, meaning that unless the GM is situated in the same physical space as the players (the same room), several communication lines are not available (Figure 3). This hinders the formation of the collaborative narrative. Furthermore, current GM toolkits do not allow on-the-fly updating of game world content as discussed above. The pre-game session generation of the scenario/content is therefore a major part of the GMs work. Because on-the-spot improvisation is not possible – with the possible exception of adding new opponents and similar minor adjustments – the scenario and game world has to be thoroughly planned in advance, programmed and readied using a GM toolkit. As the game progresses, the GM is responsible for keeping the narrative flow in a way similar to PnP RPGs, or a small LARP in case of several groups of players are involved as is possible using the AURORA engine of *Neverwinter Nights*. The GM can pre-program NPCs and opponents (*mobiles* in MMOG terminology [1] behavior and even create scripts for player conversations with NPCs. Alternatively, the GM can take control of a NPC or opponent.

Event resolution: Due to the automating of hard and soft game rules, the responsibility of the GM is lessened with certain types of events. Similar to the effect in LARPs, where a GM is physically unable to be present at every combat encounter, a GM in a CRPG using current GM toolkits is limited in the range of options open in regards to events. If non-combat, the GM can take control of any involved NPCs and direct the game and narrative in a certain direction. If a combat encounter, the GM can kill a player or opponent or summon more opponents for either side of the combat. The GM can however not make an opponent stumble in order to help a player run away. GM toolkits currently do not allow for this kind of fine manipulation of the game world.

Engagement: The level of responsibility of the GM for entertaining the players is an open question. If only five players are present, a GM is directly involved in all aspects of the players interaction with the virtual world. However, as the GM:player ratio drops, these responsibilities lessen, until they are virtually gone in a MMOG. At this point, the challenge and entertainment lies more within the preparatory work gone into the creation of the game world, and this preparation does not even have to be the work of the GM running the scenario.

In a game with a high number of players, the GM does not have enough time to provide entertainment for all players at the same time. This extends to dynamic feedback and communication flow as well.

Environment and Virtual world: Although it takes a person to generate the initial scenario and the game world using a GM toolkit from any of the CRPGs mentioned, it need not be the (scenario) on the internet.

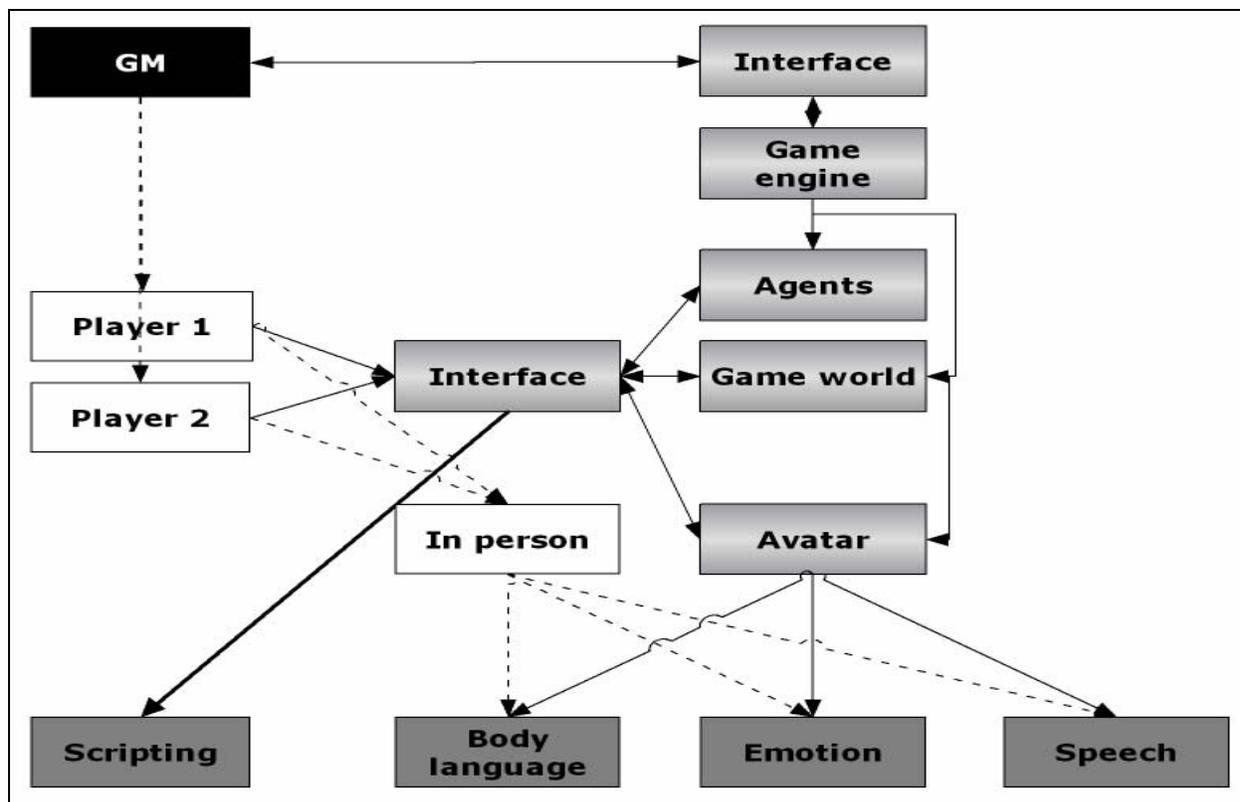


Figure 3: Communications flowchart of a GM-controlled multi-player CRPG. The GM (black) controls the game world and any events within it via a game engine and its components (light grey). Players (white) interact with the game world via an interface. Four general lines of communication exist: Scripting, Body language (covering all forms for physical action and interaction – kinesics, spatial behavior, facial expressions etc.), Emotion and Speech (dark grey). The latter three are usable via the avatars. Scripting is not associated with the avatars; although scripted text can be graphically depicted as originating from the avatars. If players and GM are in the same physical space, they can interact in person (dotted lines) (white box in center of diagram). In this case, Scripting could be replaced by Speech.

Just as a GM in a PnP RPG session can purchase a printed scenario from a store, a GM in *Warcraft III* or *Neverwinter Nights* can download a map of the actual session. In this case the GM is in charge of controlling the game world and any NPCs.

7. THE GM IN MMOGS

The specific roles of GMs varies between MMORPGs, however, the minuscule GM:player ratio and the persistent nature of the virtual game world generally means that the GMs are less visible to the players. The ratio can vary, with the average being one to a small handful of GMs per game server (with somewhere between 1,500 and 10,000 players concurrently online). These figures mean that it is possible to play a MMOG without ever meeting a GM, however, this does not mean they are not active in MMOGs.

The low GM:player ratio does alter the role of the GMs in MMORPGs significantly from that in RPGs and LARPs. Notably, GMs have less direct power over the game and the players than in RPGs. In MMORPGs, GMs cannot alter the virtual world setting with a word as in RPGs, nor do they have the direct physical contact with the players as in LARPs. Given enough time and in-game tools, everything a GM in a PnP RPG would like to do could probably be implemented in MMOGs, however, this cannot be done on-the-fly: It takes time to modify the persistent game world, and changes are problematic because

they can affect a large number of players differently. On the other hand, if GMs were given the tools to do the job, it is possible that they could be given engagement and narrative responsibilities in MMOGs.

These problems have in most mainstream MMOGs effectively reduced the GMs to handle only two groups of core functions: **Rules** and **Virtual world** (Figure 2). Commonly, GMs conduct rules enforcement, conflict solving, and, uniquely to virtual worlds: Community support and bug/exploit/farming control. In rarer cases do the GMs actually provide content. Furthermore, a virtual world remains to be developed where a GM can provide on-the-fly updates of the game world. Finally, GMs can be tasked with acting as the first line of communication between the management/development team and the game world as well as the players

In contrast to traditional RPGs, the number of players in MMORPGs and the technical problems that can arise when using a virtual world setting as the platform for the game, means that several GMs are necessary to keep the game running. These are usually distributed into teams with specific functions, such as tech support, event planning, content provision and in-game monitoring/support. Thus the specific role of the GMs varies from game to game and with what area the GM in question is working with (support, content provision etc.).

GMs in MMORPG are typically employed to act as the middle-man between the game and the maintenance/support

staff. The GM is responsible for monitoring the players and the game world, making sure that the staff is kept up to date on the game. The GMs rarely have the ability to provide content for specific players or groups of players, meaning that entertainment is up to the players themselves to arrange within the frame of the game rules and virtual world setting.

With bug exploitation, hacking, and selling of in-game content for real world money via the internet [3,6], the monitoring function of GMs have become increasingly important. This was exemplified in the original *EverQuest* (1999 Activision/Sony Online Entertainment), where GMs were used to e.g. monitor player activities or locate players who were using bots or macros, or other forms of cheating or abuse of the game. The use of GMs as a defense force against exploitative players appears to be more and more common in contemporary MMORPGs (at least in the European-American sector). This is from a role-playing perspective an inherently unproductive use of the GM resource.

8. VARIABILITY AND DEVELOPMENT OF GM FUNCTIONS IN RPGS

When studying games across the four categories, it becomes apparent that there is substantial variation within each of these, and that games within a given category can exhibit characteristics close to those of another category. For example, using the AURORA engine, it is possible to link 64-player persistent worlds. When do these cease being linked multiplayer CRPGs and become a MMORPG? Similarly, the boundary between PnP RPGs and LARPs is a grey area. If LARPs are differentiated from PnP RPGs by them having a physical dimension and character embodiment, how much can players in a PnP RPG move around or gesture before the game becomes a LARP? These variations are partly based in the categories being

based on experience and not empirical research; however, lacking better models these are the categories used as a framework for analyzing these games. Future work in games research will hopefully address these issues.

Three themes emerge when assessing the integration of GM functionality in games, notably how they vary across platforms, how successfully the tools have been adapted and integrated into various games, and finally how these toolkits can be improved for the various platforms. Focusing on the electronic games, the review presented above presents three core areas of discussion:

1) Variability of GM functions across game platforms

The variability of the responsibility of the GM in currently published games from the four game platforms seems to be linked to a limited number of core variables, notably: a) The GM:player ratio; 2) The medium of expression (perceived, physical or virtual); c) Lines of communication available; d) The ability of the GM to generate and control content and; e) Player interests, style and theme of play and the degree with which these can be taken into account when creating scenarios/plots/stories. Similarly, these variables impact on the ability of the GM and the players to create an environment where dynamic emergent storytelling can take place, e.g. in allowing player-generated content. The four game platforms appear to form doubles of pairs when considering these five core variables, however, depending on the variable in question, the pairing varies. For example, both LARPs and MMOGs have low GM:player ratios, however, different mediums are used as the basis for the games. The physical game space of LARPs is more reminiscent of PnP RPGs, because communication takes place in real life between players with all lines of communications are open (Table 1).

Table 1: Overview of core variables impacting on the responsibilities of the GM in current games. Based on current technology only. Note that a LARP can have very few players, but typically more than a PnP RPG and comparatively lower GM:player ratios.

Platform	PnP RPG	LARP	CRPG	MMOG/MMORPG
GM:player ratio	High	Medium-Low	High	Low
Medium	Perceived	Physical	Virtual	Virtual
Communication lines open	All	All	Scripting and some emotion/body language, live speak possibly via 3 rd party software	Scripting and some emotion/body language, live speak possibly via 3 rd party software
Content creation poss.	Any desired by GM	Any desired but rare	Limited by game engine	Strictly limited or impossible
Pers. storytelling	Yes	Yes	Yes	No

The availability or lack thereof of the five core features impact on the responsibilities of the GM. In general, the lower the GM:player ratio, the fewer the communication lines open, the more restrictive the medium and the less possibility of GMs and player to affect the game world, the more reduced the role of the GM. For example, the ability to create content and for the players to affect this content in PnP RPGs, LARPs and CRPGs (with GM toolkits) means that the GM is responsible for a range of features in the games (Figure 1), while in MMOGs GMs are reduced in their relative importance, because they are not involved in an environment where players can affect the game world (Figure 1).

2) The integration and development of GM functions in multi-player CRPGs

Even with the importance of the core variables in mind, it remains an open question whether GM functions have been successfully implemented in electronic games or not. On one side, the medium of expression remains restricted by technology. The invention of emotes and their use in e.g. the AURORA toolset, could be seen as a successful adaptation, however, on the other hand, emotes are immensely restrictive compared to the full register of the ability of humans to express emotion. In discussing the integration of GM functions in CRPGs, it is therefore preferable to address individual functions. While a discussion of all possible functions are out of scope of this review, two general features of RPGs deserve to be mentioned: 1) The ability of the GM to design and prepare the game world; 2) The ability of the GM to on-the-fly upgrade the

game world and respond to the actions of the players. Concerning the first of these, the AURORA toolset appears to be a solid adaptation of the classic PnP RPG situation: While restricted to a fantasy-like setting, the GM has fairly wide options in determining the layout and appearance of the game world, as well as being able to place and pre-program NPCs and opponents. While it takes a longer time using AURORA than it does using the imagination, the visual strength of the virtual world can make it worth the time. In theory, the GM can provide most of what players could request – e.g. the inside of a house they wish to explore – however, it takes time. In a PnP RPG, the GM can on-the-fly upgrade any feature of the game world using imagination alone. Similarly, the GM can, using AURORA, take control of any NPC or player avatar and use this ability to tailor the narrative to the actions of the player avatars and the desires of the players (similar to PnP RPGs). However, the GM cannot on-the-fly create new NPCs, and is restricted in the ability to communicate with the players via NPCs. This restriction can impose difficulties on developing the narrative.

The areas where the options available to the GM are most restricted provide the optimal areas for improving functionality. Notably, the weakness in the ability to respond to the behavior of the players and their avatars appears important to the overall goal of providing a dynamic emergent storytelling environment. The question is how this is done using contemporary technology, and whether it is an option that will increase the popularity (i.e. sales) of CRPGs. Without a fairly solid indication of a positive end figure, most games publishers will be reluctant to alter functionality in games.

9. DEVELOPING GM FUNCTIONS IN COMPUTER GAMES

While research into the incorporation of RPG storytelling techniques to facilitate interactive storytelling is currently being carried out [4,8,16,19,21,24], the incorporation of a PnP RPG-like GM in games such as *Neverwinter Nights* has brought focus on the possibility of having a human mind controlling a game world that thereby becomes dynamic instead of static. An alternative resides in the use of AI-controlled GMs. While GMs in MMORPGs remain largely as described above, future developments may see the storytelling environments of MMORPGs change. Combs [4] described an emerging trend away from traditional cinematic view of game design in MMORPGs, towards more AI-controlled environments, which appear to lead to a more simulationist AI future – controlled by AI game masters. GM toolsets in electronic games are restrictive compared to other RPGs, however, there does not appear to be a technological reason for why they could not be further developed. Examples include the ability to update virtual worlds on-the-fly in CRPGs or provide (possibly instanced) space as a vehicle for introducing player generated and -controlled content in MMOGs. This similar to current functionality using GM toolkits in CRPGs, or the development tools in online persistent worlds such as *Second Life* (2005 Linden Labs Research Inc.). As the closest equivalents to CRPGs and MMOGs, PnP RPGs and LARPs offer insights into collaborative storytelling that go beyond merely integrating the fantastical fictional worlds these games often take place in. GM features in such games as *Neverwinter Nights* have indicated that putting a human player in control of the game world helps eliminate some of the weaknesses of the electronic medium. Moving beyond the theme

and content of the game worlds themselves, the theory and mechanics behind PnP RPGs and LARPs are ripe for exploration.

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