

# **Investigating Using Social Media to Create Compelling Collaboratively Generated Content**

**1<sup>st</sup> May 2014**



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## Acknowledgements

The project would not have been nearly as successful without the help of others, I would like thank them for supporting me through the project as well as the help they have given throughout.

- Dr. Patrick Dickinson for being an outstanding supervisor and guiding me through this project.
- Sean Oxspring for being an awesome client and making up for my lack of art skills on the project.
- Samantha Carr-Hyde you got to listen to me rant late at night about how impossibly mammoth the task is and encouraged me keep going. Also you sustained my caffeine levels.
- All of the glorious participants who signed up to test the game and made some amazing dungeons and suggestions.

# Abstract

*Both social media integration and collaborative design have been employed to add elements to video games, this project explores the idea of merging these two together. Using a social network site as a core game mechanic that inherits the ease of use of social media as current creation tools are overly complex. This project researches the motivations behind players creating content and then the theory of flow in games. This research is then used to form the design of a game that makes use of collaboratively generated user content through the medium of Twitter. The game produced is then evaluated using a mixed methodology made up of several focus groups using a user centric designed approach and player metrics with the outcomes of the focus groups informing the next iteration of the development cycle. The outcome of this suggests that these elements may have a positive effects on user engagement.*

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# 1 Project Background

## 1.1 Introduction

This introduction will briefly explain what collaborative design and user generated content is and why they are interesting areas of study. The popularity of social media and how it currently is integrated badly into games is also discussed.

Allowing users to create content is becoming more prevalent in games as developers begin to realise how it can bring more players into the game and allow users to feel emotionally attached to something that they helped create (Salen, K. and Zimmerman, E. 2003). This created content can vary depending on the genre of the game as well as the tools the player is presented with. It is very common in games to allow you to customise or create a character – such as in *The Elder Scrolls V: Skyrim* (Bethesda Softworks. 2011) has a very advanced character creator (Fig 1) .Character creators like in this game have been proven to enhance user enjoyment (Trepte, S. Reinecke, L. 2010).



**Fig 1:** Advanced character customisation to allow the player to bond with the character in Skyrim

Collaborative designed content also known as co-created content, is used in many different aspects of development but is currently the most prevalent in video games (Green & Jenkins. 2009). Co-creation can be the players creating content for the game using an in game set of tools like in *LittleBigPlanet* (Media Molecule. 2008), in which the player is free to create anything that is possible through the premade assets. It can be where players help create the game by working with the developers to input design decisions from playing (Banks, J. 2009).

Social media sites have become one of the most popular things that adults and teens use on the internet, games are interwoven into these social networks sites as standalone games that make use of the social network (Rossi, L. 2009).

These games that are based inside the social networks sites platforms like Facebook rely on the users existing social network connections. For example a user may ask an already pre-existing friend for a carrot for his virtual farm. These social network games make use of Richard Bartle's player type model with players falling into a certain archetype of play (Bartle, R. 2004). Depending on their player type it depends on how they socially interact with those around them which leads to interesting play. These social interactions are becoming increasingly popular aspects of play. (Marriott, T. 2011).

## **1.2 Motivation**

### **1.1.1 Collaborative Design**

There are two main motivations for this project the first being the idea of collaborative design. Collaborative game design is not something that is new to the industry, however so far it has not expanded into allowing users to work together to collaboratively design parts of a game. Banks refers to this as co-creation, where the developer and the end user have an equal share in creating the game and brings up Little Big Planet as the example (Banks, J.



2008). *LittleBigPlanet* (Media Molecule. 2008) is a game where co-creation was the main point of the game and the single player campaign served to train the player in how levels should be constructed. From here the player has all the tools in game to create anything they can imagine and share it online all through the same tools (Sotamaa, O. 2010).

Using the level creator from this game, Sony announced in 2010 that over 2 million levels had been made using the games creator tool, it's clear from this that by having the creation tools inside the game has allowed millions of people to co-create and share content with other users. There are some downsides in the way co-created content is currently done in that to make complex and interesting levels the user creating must be highly skilled with the tool set. Someone new to the game cannot simply make a complex level from the start (Westecott, E. 2011). Because of the high entry barrier to co-creating content many people who are likely to be creators are not able to do so. This will be one of the main motivations for this project, to aim to make co-creating content accessible to a wider audience, this ties in with the other motivation behind the project using social networks as the platform.

### **1.1.2 Social Networks**

It has become common place for games to integrate with some form of social media with games like *Candy Crush Saga* (King. 2012) integrating with both Twitter and Facebook (Stark, H, 2013). This integration of social media has proven extremely successful for King the developers, with the game making over \$800,000 per day in revenue (Thinkgaming. 2013).

However despite the success of using social media in games there have been very few examples of using the social media as a main mechanic in the game rather than just allowing to tweet your high score. *Witch Potion* (Y, Alictus, et al. 2014) makes use of the Twitter follow system as a friends list for people playing the game, but it is still not intrinsically linked to the gameplay.

Another mobile based game *Doodle Jump* (Lima Sky. 2009) has both Twitter and Facebook integration but again it is limited to posting high scores and not the actual gameplay.

There is a distinct lack of games that focus on the use of social integration as a core mechanic, it is something that will be interesting to find out what the effects are on the players engagement with the game when it is making integral use of social network features. Users often use social networking sites to express themselves (Guosong, S. 2009). This idea of expression is also present in user generated content in games as the players motivation for creating content has also been found to be for expression (Salen, K. Zimmerman, E. 2003).

Both of these link into Leblanc's theory of fun in which he suggested that games needed to have 8 different elements to be considered fun (Hunicke, R. et al. 2004). One of these is Expression, giving the user the chance to express themselves through allowing them to create something or make a decision. This can be seen in games as detailed above but also when a user posts something to a social network site it could be considered expression. The other theory of fun that they share is Fellowship, the idea that the game is a social framework in itself and that players can interact with each other through the mechanics in some way. Social media is also the same as it has the element of fellowship by its nature.

The purpose of this project is to see the effects that user collaboratively generated content has on players while also being linked in with social networks simultaneously, as this is a new research area that games haven't taken advantage of evidenced more clearly in the background research.

### **1.3 Client Specification**

This project is being directed by the client's specification, which is to research the viability of a multiplatform game that made use of social media as one of

the core mechanics of the game. The game must make use of Twitter as the main form of social integration with the suggestion that the content in the game is created from the content of a user's tweets. The Client has also specified that the game must belong to part of the dungeon crawler genre with rogue-like elements and hopefully have some commercial viability.

### **Client Required Features**

- User Generated Content
- Collaboratively Designed
- Twitter integrated into the core of the game
- Dungeon Crawler genre

As the client wishes for the game to lead on to a commercial property they will be creating all art assets used in the application.

## **2 Literature Review and Background Research**

### **2.1 Literature Review**

This section aims to perform a thorough and in-depth literature review of available sources in the areas that the project hopes to address after research has been conducted a well-informed set of objectives and aims can be presented. Research was carried out in several key aspects. First a background research into Collaborative design was conducted discussing what elements make for successful collaborative content. Leading on from this research was conducted into user generated content and participatory culture which was followed by researching the motives behind the content creators. From here research about player motives a section on player types and how these can also be applied to content creators is presented. To round out the projects understanding a research section on the Twitter social network is present. The final section of the literature review discusses some of

the problems with current content generation tools and ways in which they could be improved in the context of this project.

### **2.1.1 Collaborative / Co-created content**

Collaboratively designed content is the act of multiple users working together either simultaneously or at different times to create content. This content can be anything to a full level of a game or just a new weapon. Creators come together as it allows them to share design ideas or take advantage of having a diverse set of skills (Sarvas, R. 2005). Sarvas stated that communities form from these endeavours of co-creation. This is interesting as in a study of MMO communities by Elklund (2014) she concluded that MMO's acted as a foci, a point of interest for which friends and social groups were formed (Elklund, L. Ask, K. 2014) This goes in line with what Sarvas stated where rather than the game acting as a foci the act of co-creating content does.

A very important part of co-created content is that it allows them to create their own crafted experience of the product, Harwood (2011) points out that with products that allow co-creation is that once the product has shipped it is no longer in the hands of the owners and instead the consumers and they control how it evolves. Due to the nature of expression, when players create content together they will try and explore the limits of the game (Harwood, T, 2005) this links into Bartle's (1996) player types which is discussed further in section 2.1.4

There are some downsides to co-created content in that some players will release levels unfinished or impossible to beat (Sotamaa, O. 2010). Another prominent problem that has arisen is "griefing" where a player will intentionally annoy another player and disrupt what they are doing (Kirman, B. *et al.* 2012). However Kirman also points out that for a lot of players this is what appeals to them and is the reason for playing the game, which links in with what Bartle refers to with his player type theory where each user is a player type and this corresponds to how they play and how they get their enjoyment from the game (Bartle, R. 1996). This is an area of study that may

prove interesting for the project to allow for a user to grief but to limit the impact of it on other players.

The idea of collaborative designing content may also pose some problems as not all players want other players to be able to alter what they have created, as they can fill attached to it. But due to the nature of having collaboratively designed dungeons they have no choice. An ethnographic study was done on players and concluded that changes made by a group of users to the game world would negatively affect the other group's feelings towards them creating social tension (Pearce, C. *et al.* 2009). From the outcomes of this it would be worthwhile to design the game to not allow players to change or alter another player's already existing content.

### **2.1.2 User Generated Content**

*“Audiences and users of new media are increasingly active –selective, self-directed, producers as well as receivers” (Livingstone, S. 2004)*

Player created content very often comes in the form of ‘mods’ short for modifications, these mods are normally modifications to existing games or game engines and range from simple model changes to full blown new games. A company that has taken full advantage of its user base wanting to create mods, was Valve. From this mod friendly approach that Valve took it has led to them creating several games (Barret, V. 2005). However that's not the only role that modding has, as it has also been used to further bolster already existing games sometimes to add more content or realism (Moshirnia, A. 2007). Moshirnia found that by allowing players to mod the content directly they were able to get a much more accurate representation of historical events for a war game. The current problem with creating content for games is that it requires technical skills beyond just coding art assists and models need to be created as well as a good knowledge of the game at hand (Maia, E. 2005).

Creating new content for a game can be “*Considered as playful, challenging and exciting activity*” (Fuller, J. *et al.* 2005) and not just an arduous task that needs to be done. The act of creating new content that is player owned is a freedom of expression of the player allowing them to express themselves however it also allows the user to display control over the game. Being able to change the game world also allows the user to experience independence and self-efficiency (Fuller, J. *et al.* 2005).

From this idea of feeling proud of creating content it is possible for users to experience the state flow, the idea of an experience that is neither too difficult for the user to complete or too easy that it poses no challenge to the user but instead rests in the middle of both of these leading to a positive user experience that is matched towards the users skills (Csikszentmihalyi, M. 1992).

The concept of flow wasn't originally applied to video games but as a general psychological theory Mathwick and Rigdon (2004). Applied this principle of Flow and the Four-Channel Flow model to gaming linking the act of creating something can be perceived as an act of playing thus making it applicable to the flow model (Mathwick, C. Rigdon, E. 2004).

The Flow model is comprised of 4 parts defined by Csikszentmihalyi (1992)

- Flow – The challenge and skill required of the task are balanced for the user and flow is achieved.
- Boredom – The skill of the user exceeds what is required and the user becomes bored
- Apathy – Skill and challenge both fall below what the user is expecting.
- Anxiety – Challenge exceeds the users skill level for the task

It is important to consider this concept of flow when designing a system as it should allow for a more positive experience for the user. The idea that games are a series of challenges and conflicts (El Rhalibi, A., *et al.* 2014) can be

applied to the tools used to create user generated content. In order to create highly usable tools for all users other concepts also need to be considered which are discussed in 2.1.6 Creation Tools.

### **2.1.3 Social Narrative**

Games naturally require interaction from the player in order for the game to progress and while this counts, developers have been trying to make the narrative of the game also be affected by the player beyond the normal win/lose conditions. Games like *Mass Effect 3* (Bioware. 2012) and *Fable 3* (Microsoft Studios. 2010) rely on giving the user some control over the narrative. But there are limitations with this as any narrative option given to the player must be predefined by the developers (Ryan and Gilson. 2013). This limitation doesn't stop users from trying to create more narrative though. As research by Ryan and Gilson found, fans of the *Mass Effect 3* video game created more narrative for themselves together using the medium of Twitter.

This idea of user created narrative forms part of a participatory culture that has surrounded recent games for example *Minecraft* (Mojang, 2011). Some players play the game creating elaborate story's and challenges through the games already existing tool set. They provide word documents with lore or objectives for the potential player to read (Haak, A. 2012). This content is also commonly collaboratively designed with players working together in a single map building the world and story, in essence they take on the role of game designers. This research shows that users who wish to create will provide the narrative either through the game or through external means.

### **2.1.4 Player Motivation**

The goal to create a narrative is one motivation that can drive a user to create but there are also others. The concept of Flow as discussed above provides players with a motivation for both playing a game the force being that the game is challenging. As discussed above flow can also be part of the creative motivation when linked into how easy the tools are to use.

Sotamaa did research into content creators motivations when modding and adding content to existing games (Sotamaa, O. 2003).

- Pleasure of Hacking / Researching the game – this could be consider exploring the possibilities of the game’s engine or editor. Users were looking for secrets or ways to do previously impossible things
- Self-Expression – This can be linked towards player ownership of content as well as wanted to express themselves through the game.
- Community Building – co-creation or similar to *Minecraft* (Mojang 2011) building content for other players to use with the satisfaction coming from that.
- Potential commercialisation – The possibility of selling their creation or developing their skills doing so to become something more than a hobby

Jansz and Theodorsen (2009) set out to further understand what drives a user to create and also what type of person decides to create content. They found out that while sometimes the idea of commercial success is one motivation that it didn’t occur often enough to be always considered a key motivator. What they did find however is that the motivation of a content creator can be dependent on the genre of the game. Going on to say that a user that makes a custom texture model has a different motivation as oppose to someone who creates an entire new level of a game (Jansz, J., Theodorsen, J. 2009). They theorized that any motivation a player has to create could be split into 6 categories: Improving, Creativity, Self-marketing, Community, Entertainment and Love for the game.

Another interesting thing that was found during the motivation study by Jansz and Theodorsen (2009) was that all of the players that did create game modifications spent a substantial amount of time also just playing the game. These players would spend 8.5 hours on average a week modding games on top of any of time spent just playing meaning that it wasn’t mutually



exclusive. It would be interesting to find out if this theory still stands when it's co-created content in a social environment as well.

Bosch *et al.* (2011) did a comparable study to this and reached a similar conclusion in that they also found out that players that didn't create content did so as they felt that the act of creating content was too time consuming or that they lacked the knowledge to use the tools a problem that is discussed more thoroughly in section 2.1.8 Creation Tools. Another more interesting problem they found was that players didn't want to start creating content due to the high polish of already existing content, concluding that if a player doesn't feel like they can add a valuable new addition it's not worth doing (Bosch, F. *et al.*, 2011).

One problem with the results of this study is that as they found out genre can affect the motivations of the player and the study was only done on two genres. This does leave room to expand this theory for this project though and test the theory under the dungeon crawler genre. As both Bosch (2011) & Theodorsen (2009) found is that player type as well as genre can affect these motivations the concept of player types will be discussed in 2.1.7 Player Types.

### **2.1.5 Twitter**

Microblogging is a form of social media which Java describes, "*Users can describe their current status in short posts*" (Java, A. 2007). Twitter is one of these sites which as of 2013 has over 500 million users and 58 million tweets are posted each day (Statistic Brain. 2013). Twitter however does not obey the standard social media characteristics as not only is it a microblogging platform but also a news aggregate (Kwak, H. *et al.* 2009).

Twitter users are able to tweet video links, status updates, or any manner of things as long as it remains under the 140 character limit. Twitter uses a different style of friend system when compared to more traditional social media sites in that a user can follow any other user and this will cause any

tweets that the user posts that are not direct reply's to appear in their news feed (Java, A. 2007). As well as its main purpose of being a micro blogging site many Twitter users use the site as a mix between a news site to keep up to date with more specific news but also to stay in touch with friends (Johnston, K. 2013)

Social network sites have been studied to see what positive effects the user has from using them on a regular basis. Oh *et al* (2014) summarised findings from a myriad of research concluding that person-directed communication can lower loneliness and enhance or even create new friendships (Oh, H. *et al*. 2014). It was also noted that using social network sites without directly acting with another user also gave positive emotions although this is an area that is lacking in research. Twitter makes heavy use of notifications with the user being sent an alert any time anyone mentions or talks to them, it would leverage the use of these in order to create a more social game that would help the game appeal to the Socialiser archetype as define by Bartle (1996) but also to add one of the 8 kinds of fun, Socialiser (Hunicke, R. *et al*. 2004).

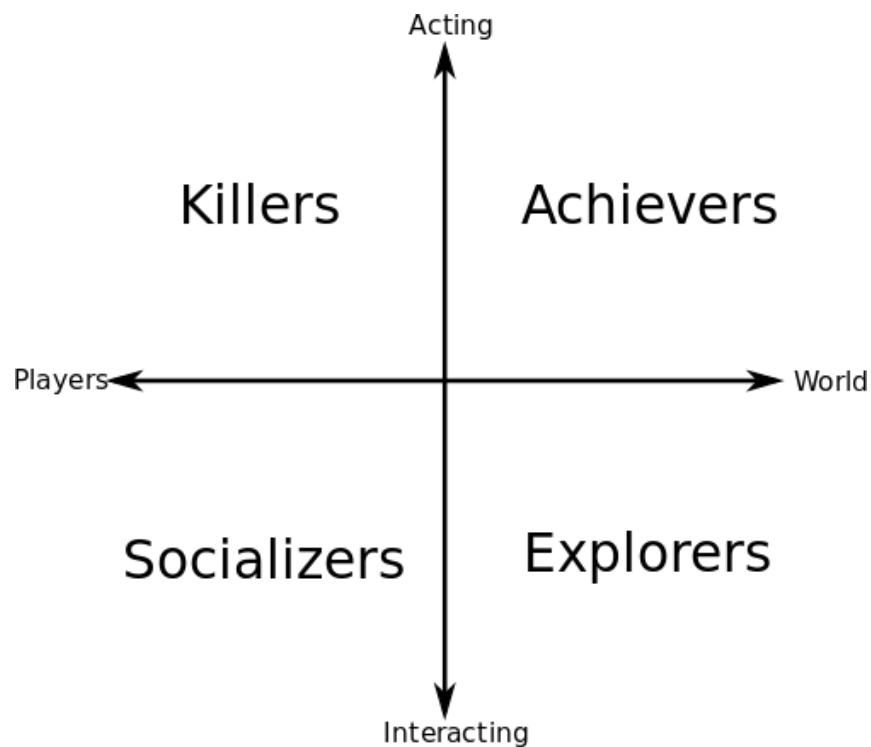
### **2.1.6 Player Types**

The term 'player types' refers to the different aspects of a game that they find enjoyable. While there has not been research into the types of players that enjoy creating content in the context of collaboratively creating in a social context. It is important to understand the different types of player as to make sure the game appeals to them (Yee, N. 2007). There has been plenty of research into player types in other aspects of video games. MMO's however have had lots of research done into player types with Bartle (1996), who concluded that the types of players could be split into 4 archetypes that explains the different types of players but also their interactions with each other (Bartle, R. 1996) (Fig 2).

The 4 player types that Bartle proposed were:

- Achievers

- Explorers
- Killers
- Socialisers



**Fig 2:** A diagram of how Bartle's player types interact.

It's important to note though that these types that Bartle (1996) concluded are not exclusive and a player isn't just a Killer but instead the player will lie inside a spectrum between the 4 depending on what they like to do. The role of these types was not to just detail what player types wanted, but also how players would interact with both the game world and other player types.

Yee (2007) did further research into player types expanding on Bartle's original types when trying to find out more on the motivation of the players (Yee, N. 2007). Yee concluded that there were 3 key things that affect the player's motivation to play; Social, Achievement and Immersion. This is interesting as both of these feature similar conclusions to the results found in the motivation section (2.1.4) of this review with both Sotamaa (2003) and

Jansz and Theodorsen (2009) also revealing that content creators have a similar set of goals for playing.

Although these theories were primary designed around MMO (Massive Multiplayer Online) games they can still be applied to other genres, and in the context of this project it will be wise to include content that will appeal to each player type as it will help evaluate how Twitter and co-created content work together by providing a player type base and a clear way of studying there interactions.

### **2.1.7 Creation Tools**

In order for a user to be able to make content for a game the game must provide the tools and systems that allow for this to happen. There are however problems with tools in games being overly complex (Westecott, E. 2011). Due to the complexity of the tool it can put potential creators off so it is necessary to make sure that the tool design is accessible and designed for heterogeneous user groups. Fuller *et al* (2005) identified several key features of a creation toolkit that need to be in place in order to make it usable by a wide skill range of users.

The first is user friendly, the tool must be intuitive to a user without the need for a tutorial or manual. The layout and work flow of the tool must be clear and simple. The second is to provide different options of creating depending on the skill level of the user, there should be a beginner's option with less features or pre-constructed elements already present and then extra tool sets that the user can use if they want. The third element that should be according to the study that Fuller *et al* (2005) did is trial and error functionality, providing a system that allows the user to create something and then test to see if what they have created looks and works as they intended. This is because the user is then given the freedom to evaluate their own decisions and from this become better creators. The final element defined by Johan is

to have already existing examples of content created in the editor available to the player so that they can learn by example.

Palosaari (2011) stated how it's very important for the tool to make sense in the context of the game as to not hurt immersions (Palosaari, E. 2011). In the same paper Palosaari also concludes that by allowing the players to impart their personality into the creation it adds to the emotional attachment, of not just the creator but also anyone else that comes into contact with the creation, which in that papers example was a creature. This is worth considering when developing the creation tools for the game as being able to allow the user to personalise should lead to them becoming socially attached.

### **2.1.8 Dungeon Crawlers and Roguelikes**

In the client specification they have asked that the game be based on current dungeon crawlers and Roguelike games such as *Binding of Isaac* (McMillien, E. 2011). Roguelikes are a subgenre of RPG's (Role Playing Games). Key features of Roguelikes include randomly procedurally generated content which creates the bulk of the game, permanent character death is the other key defining mechanic. Once the player dies in the game that character is deleted and no longer available for play (Gardia, B. 2013).

Because of the randomly generated worlds that are new each time the player starts the game it keeps the game feeling fresh. These procedurally generated levels are often done using complex algorithms to turn a random number into an interesting dungeon (Anderson, 2008). Due to the fact that Roguelikes have a high difficulty which leads to death often it becomes part of the game, with mechanics building off of each death to help the player though the next play through. (Gardia, B. 2013).

Gardia (2013) also states how an important element in Roguelikes is the "Hack'N'Slash" the concept of clearing your way through an area by killing hordes of monsters. This element is part of the bigger aspect of exploration

and discovery which from the player type research an important factor for players who enjoy exploring.

Dungeon Crawlers, also known as Action-RPGs feature similar mechanics to what Gardia described about Roguelikes. However normally levels of the game will not be randomly generated but instead designed by a level designer.

Schaefer (2000) wrote about the experience he had designing *Diablo 1* (Blizzard North. 1998) and *Diablo 2* (Blizzard North. 2000), two popular Dungeon Crawler games. In Schaefer's post-mortem of the two games he stated how one of the key design mantras was the "Kill/Reward" for all basic gameplay. This concept was based around giving the players rewards in the form of loot and experience every time they killed a monster or completed an action (Schaefer, E. 2000).

Another design methodology that Schaefer and his team used was the 'Mom test', they would often get non-gamers to play test the game and see if they could play it. If they struggled to do something for example sell an item, then they would make it possible for the player to sell an item the way they were trying (Schaefer, E. 2000). From this design method they started the left click to perform nearly all actions which is standard in the genre today.

## **2.2 Literature Review Summary**

From the research into collaborative design it was found out that the content creators use it as a platform for expressing themselves and also to work together with people and socialise (Sarvas, R. 2005). The fact that the act of creating content in a group has been found to be engaging and meet social needs of the players and that in this context the game acts like a Foci for the users (Elklund, L. 2014). There are several issues with giving users the power to co-created in the form of griefing, although it should not be removed entirely as it is a style of play that some users enjoy and instead should be minimised (Kirman, B *et al.* 2012) (Bartle, R. 1996).

It was found that the act of content creation much like collaborative design was also mainly an opportunity for the user to express themselves (Fuller, J, *et al*, 2005), although other reasons for players wanting to create content included exploring the boundaries of the game and to further their skills. The interesting thing to come from this research was the idea of Flow in games also applying to creating content both alone and collaboratively (Csikszentmihalyi, M. 1992) (Mathwick, C., Rigdon, E. 2004).

Motivations of players that create content was also explored including what would make a player want to create content for a game, but also what puts players off of making content. All the motivations for a content creator were split into 4 key motivators that will be used further in the project (Mathwick & Rigdon. 2004). The Bartle player type theory also helps to explain the motivations of players not just limited to content creators as it was found that even content creators still needed to enjoy the game to have the motivation to play content on it (Bartle, R. 1996).

User's motivation for using social media sites and a background research into Twitter revealed that users enjoy having messages or notifications sent to them and a user study examined people creating extended narrative for a game using the medium of Twitter as its base (Ryan and Gilson, 2013).

The current state of in-game content creation tools are very lacking in the user intuitiveness and that a hard to use system will discourage content creators from creating which is the opposite of what it is meant to do. Fuller, J, *et al*. (2005) defined key traits of creation tools that will be followed for the project in the hopes of combining the ease of Twitter and creation tools to make it accessible to anyone.

Finally Dungeon Crawlers and Roguelikes were researched to find out what mechanics would need to be included in order to meet the client specification. What was found was the idea of a Kill/Reward mechanic and simple user controls make a good dungeon crawler game (Schaefer, E, 2000)

whilst elements of randomness and the concept of permanent character death are genre defining mechanics for Roguelikes (Garda, B, 2014)

### **3. Aims & Objectives**

The goal of this project is to see if using social integration and collaborative designed user generated content, which can be played and created by everyone can be more engaging and fun as defined by LeBlanc's elements of fun. To do this a simple Dungeon Crawler with Roguelike elements will be developed which will allow the users to create rooms of a dungeon using the social media site Twitter. Each dungeon will be created entirely by other players collaboratively working together and will be able to be played by anyone.

#### **3.1 Aims**

- Investigate if user generated content affects player base retention and engagement.
- Develop an intuitive way for the user to design using the limitations of Twitter of only allowing tweets to be 140 characters.
- Allow for users to explore and rate other players content and collaboratively add to it.
- Prototype the artefact of a dungeon Crawler / Roguelike game using mechanics and concepts informed by the literature review for the client.

#### **3.2 Objectives**

- Develop a way to read and post to Twitter from within the artefact.
- Develop a prototype dungeon crawler with enough content to effectively evaluate the projects goals.
- Design and implement a system that allows a user of any skill level to create a dungeon room.



- Implement a way of storing player metrics to a server.
- Run a preliminary focus group to get early user feedback and allow them to feel like part of the design.
- Run second focus group with set tasks for the participants and a in-depth interview afterwards.
- Analyse and Evaluate the qualitative data from the focus groups.
- Run final large scale test group for quantitative data in the form of player metrics.
- Analyse and evaluate the quantitative data from the player metrics.
- Evaluate Twitter as an interface for game design.
- Summarise the results of the project.
- Perform a critical personal evaluation of the project.

## **4. Method**

This section will detail the methodology of the project including the design aspects and implementation of certain features and an evaluation of them. This will include a review of the chosen project management methodology, research methods and an analysis of tools to be used.

### **4.1 Project Management**

#### **4.1.1 Development Methodology**

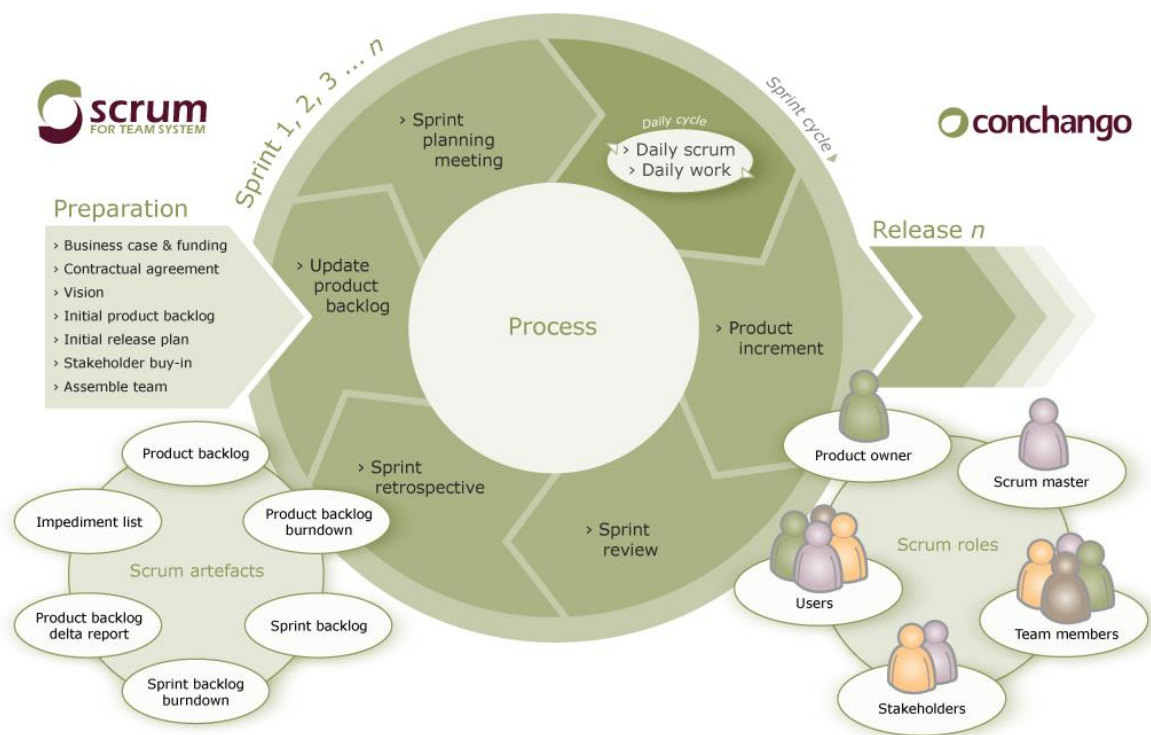
There are several different possible software development methodology's that would be applicable to a project of this scale and length. Although due to the nature that it's just one person working on the project a traditional waterfall methodology such as PRINCE2 or DSDM variant would not be optimal and would likely slow down the progress of the project due to the rigid structure and formalities, because of this it has been decided that the project will be conducted under agile based methodology variation known as Scrum.

The main benefit and reason for choosing an agile development methodology is that on top of it working very well in small teams like the one for this project it also allows for an iterative development cycle. Which suits the needs of the project in helping the end users become part of the design (Wright, P, & McCarthy, J. 2010). Since the project will be conducted under a slight user centric development cycle the project will have two iterations of development to allow for a suitable amount of feedback from the end users.

Using an agile method also helps to minimise the effect any potential risks have on the project that could cause delays. Rather than setting out all tasks to be done and estimate the timeframes they will take at the start of the project. It is instead done as the project evolves and remains fluid and open to change where a more traditional waterfall method would be locked in place causing delays and holding the project back.

For a project that is using Scrum at the project is broken down into sprints which are essentially just iterations of the development cycle (Fig 3). At the

start of each sprint the team create a wish list of features for the project, anyone on the team or clients can add wishes to this list. Then the sprint must be planned by taking features out of the wish list and turning them into tasks which are then sorted by their complexity and estimated time taken to complete and priority. After this the sprint starts for a predetermined amount of time normally under a month long, at the end of the sprint the new features should be implemented and after review by the team and any clients you repeat the process until you have a feature complete product. Throughout each sprint a member of the team would be designated the Scrum master and would be in charge of making sure that the wish list and tasks are up to date and allowing the team to work efficiently, this role is not a manager role and the scrum master is not in charge of anyone.



**Fig 3:** A diagram of an iterative cycle using SCRUM

Because the project is being undertaken by only one person there is no strict need to follow the methodology exactly so some aspects of it will be changed and loosened to help maintain a fluid development environment.

The sprint system will still be used as it allows for a meeting with the client to have input throughout the development stages. The other benefit of this is that the end users will also get to participate in design by playing a version of the game at the end of each sprint. It will also allow focus on getting a working build of the artefact as quickly as possible which will then enable more time to be spent on implementing social features and, on the creation tools. As it is just one person there will be no need for the Scrum master either since their duties will be done anyway.

#### 4.1.2 Gantt Chart

A Gantt chart has been created in order to help visualise the stages of the project and to provide an effective time frame (Appendices 7.1). A Gantt chart *“Is used effectively in simple, short-duration types of projects.”* (Wysocki, R. 2012). However as Wysocki points out that a Gantt chart is limited in that you cannot fully understand the scope of a task by just looking at the Gantt chart. The timeframe for each section of the project on the chart have been given buffer windows to prevent from any setbacks causing the project to fall behind schedule. Enough time was left between the end of the project and the actual deadline in case something critical goes wrong with the project allowing up to four weeks of extra time if needed.

#### 4.1.3 Risk Assessment

In order to make sure that the project finishes within time and to minimise the effect of things that could go wrong a risk assessment chart has been created detailing potential risks with plans to combat them.

Risk ID	Risk	Likelihood	Impact	Cost	Contingency Plan
R1	Software Issues	Medium	Medium	Software issues such as code not being compatible with old versions may cause the project to run behind schedule	Multiple software packages at hand as well as keeping the software code version backwards compatible.
R2	Hardware Issues	Low	Medium	Hardware issues like computers	With work being backed up the cloud

				breaking would cause delays to the whole project	the work can be done on any university computer.
<b>R3</b>	Server Issues	Low	High	Issues with the server that the game script is on could cause player metrics to not be stored. Making Quantitative evaluation impossible	Have a backup method of storing the player metrics into a text file that can always be accessed and for added safety this will be backed up to the cloud.
<b>R4</b>	Implementing Twitter Handling	Medium	High	Due to never using the Twitter API it may prove too complicated to use. This would mean major changes have to happen to the project.	Game Maker features some basic Twitter features that could be used although features would be lacking the project wouldn't come to a halt. There is also a buffer for this stage of the project in case it proves a bigger hurdle
<b>R5</b>	Twitter API changes mid project	Low	Medium	Twitter could change how there API interaction works nullifying any code implemented at that point. Causing the project to fall behind schedule.	While this is unlikely to happen as Twitter recently updated its API to 1.1 if it was to happen through the course of the project the only way to deal with it would be to implement new code.
<b>R6</b>	Lack of skill	Medium	Medium	A lack of programming skill could cause delays with the project	Design the project within the capabilities of the programmer. As well as researching into the areas that may prove problematic
<b>R7</b>	Focus Groups	Medium	High	Unable to gather enough participants for focus groups or not able to retain the same participants for the second group.	Have multiple opportunity's for the groups to be run on different days to give an error buffer if participants don't show up. Which will prevent the project from falling behind. A buffer is in place for

					this stage which would allow time to set up another focus group.
<b>R8</b>	Data Loss	Low	High	Corrupted data could cause all data to be lost	All work is being backed up to Google drive as well as source control being utilised.
<b>R9</b>	Questionnaire	Medium	Medium	Unable to obtain permission to use the PENS. Would mean a different evaluation strategy would be needed.	Obtain a different questionnaire or develop one for the project in case this happens such as GEQ

## 4.2 Tools

### 4.2.1 Game Engine

As the client has specified that the game be a 2D dungeon crawler for developing the project the 2D game engine GameMaker:Studio will be used. This has been chosen as it has several benefits the first is that due to the easy nature of its GML language which is based on Objective C it allows for very quick implementation and iterations of features which will prove invaluable for the project “*Making games development 80 percent faster than coding for native languages.*” (YoYoGames. 2014) Due to the client expressing interest in the prototype being commercially viable GameMaker:Studio was chosen as it can export to multiple platforms with the same code base. While other engines like Unity2D or XNA may have been viable it is likely that the project would progress slower in them and have been disregarded due to this.

### 4.2.2 Languages

**GML (Gamemaker Language)** – As the project is being developed in GameMaker:Studio the native language of the engine will be used. As mentioned before GML is based on Objective C and follows standard objecting orientated programming principles.

**PHP** – Due to the fact that the project will need to communicate with the Twitter API in order to use the data from the tweets another programming language needs to be used as GML is not capable of doing it. PHP has been chosen as the language that the project will use for communicating with Twitter as it is easy to implement complex features quickly (Inviqa.com, 2014). PHP is a server-side object orientated scripting language. Twitter has a web based API that PHP can easily access which should allow the project to go ahead smoothly. PHP requires a server to execute on so the code will have to be hosted on a private server.

#### **4.2.3 Development Libraries**

As this project is being done by one person to enable the project to be completed before the deadline some external software libraries will be used.

**MySQL** – MySQL is an open source online database system that much like PHP is web based allowing for easy cross platform and internet accessible data storage. MySQL requires a server to be hosted on again like PHP and any commands to MySQL need to be done in PHP. The project will be using this to store the player metrics that will be recorded during the final test group and room interaction details. MySQL has been chosen as it allows for the data to be stored anonymously from any computer without having to be retrieved and is very reliable to prevent data loss (MySQL.com, 2014). As MySQL is web based it will allow the last test group to have a larger sample size.

**TwitterOauth** – TwitterOauth is a PHP library that handles the connecting to Twitters authentication servers written by originally written by Abraham Williams it is open source and hosted on GitHub so anyone is free to add to it. To query Twitter for data you must use their Oauth API which is made much simpler using TwitterOauth. This is discussed in more detail in the implementation section 4.3.1

The repository for TwitterOauth can be found at:

<https://github.com/abraham/Twitteroauth>

## **4.3 Implementation**

One of the main aims of this project is to prototype a dungeon crawler game that allows for users to collaboratively create and design content for the game using the medium of Twitter. The implementation will be broken down into separate sections starting with how the Twitter functionality was implemented. Then on designing how rooms are generated and created using tweets based on findings from the background research. Following on from this, the design decisions and implementation of the in-game creation tool set will be detailed. Next the implementation of the chosen social features explaining why they were chosen. Finally the creation of the gameplay mechanics and general game features again based on the findings of the background research.

### **4.3.1 Twitter Implementation**

Before the project could become fully underway it was important to address R4 from the risk assessment chart see section 4.1.3. This risk was that due to complications or engine issues it would not be possible to implement Twitter inside of GameMaker:Studio. To address this a small prototype was created that would simply read in Twitter data to prove that it was feasible for the project to be done.

#### **Posting**

The first part of the Twitter functionality that was to be implemented to test was the ability to post, create and write a tweet inside the program and have it post to Twitter. There were two possible ways of doing this within GameMaker:Studio henceforth referred to as GMS.

The first option would require the user to log in to their Twitter account through the application storing their username and password which would



then be sent the PHP script on the server and then forwarded to Twitter where it would post. The main benefit of this method is that the user would never have to leave the application and it would remain in focus. The posting of the tweet would be easier for the user as all they would have to do is press post and it would be done. This would lead to a better experience for the user but it comes at a high cost.

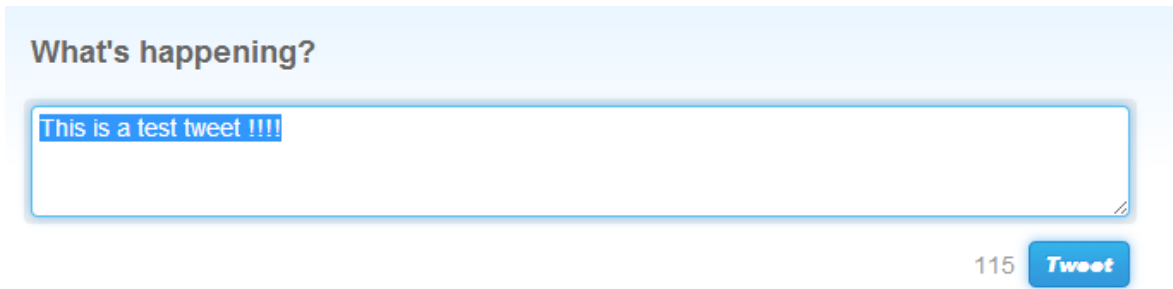
This cost being that as the user's password and username would have to be stored on the Server. This poses several problems, the first is that sending it to the server would not be encrypted. Making it viable to package sniffing which would allow anyone who wanted to have access to their account details.

The second problem would be that once it is stored on the server in a MySQL database it would again be susceptible to database injections meaning again the users details would be at risk.

Another problem with this method of Twitter posting is that the user may not even want to store their details for various reasons which would separate the player base of the game and risk damaging the fun they would have as they may feel segregated.

Due to all these problems it was decided to not use this method and instead opt for making use of Twitters HTML encode post functionality. By using this method the user does not send any data nor does any of it need to be stored so it solves several of the major problems that the other method had.

However due to the way it works it would require the user to already be logged in or to log into Twitter on the device they are playing the application on in order to post. When a tweet is posted it will minimise the game and open up the Twitter app, if on a mobile device or the operation systems default internet browser and go directly to Twitter. The user will then see the tweet box already filled in (Fig 4) and just needs to press post and it will be posted.



**Fig 4:** The screen shown when a user tweets.

To get this to work the URL\_OPEN function was used. This function simply opens the URL that is specified in the parameters, the line of code used can be seen below

```
url_open('https://Twitter.com/intent/tweet?original_referer='  
+ referrer + '&text=' + message);
```

When this line of code is called it opens up Twitter and uses Twitters HTML Post API which allows the data contained within the URL to be posted as a tweet. A problem that was encountered was that as the data was being passed through HTML it all needed to be encoded as such or the tweet contents would be incorrect.

## Reading Tweets

Being able to read in Twitter data was one of the main objectives of the project as previously mentioned, in order to make sure that it was feasible the application used to post tweets was amended to also be able to read them in.

To do this first a PHP script needed to be created that would be able to pull in data from Twitter when requested. As previously mentioned in section 4.2.3 an external library of existing PHP scripts was used to handle the Twitter authentication. This was because Twitter requires any request to be from a Twitter developer account and you must pass the account details when trying to pull data. The TwitterOauth library made this a lot easier and allowed for focus to be on actually reading the data in and not fiddling about with authentication.

Now that authentication was done, requests could be made to the server by executing the script which would then return a page full of the requested data (Appendices 7.2). The data that Twitted gives back is in the JSON format which is very similar to a 2D array or list data structures. The line of PHP Script that query's Twitter can be seen below;

```
$connection = new TwitterOAuth($consumerkey, $consumersecret,
$saccesstoken, $saccesstokensecret);

$tweets = $connection-
>get("https://api.Twitter.com/1.1/search/tweets.json?q=".$sea
rch."&count=".$notweets);
```

In order to get this data into the application the application itself needs to be able to call the script and then accept data. To do this a function inside GMS is used called HTTP\_GET. Using this function in the test application when the red button is pressed it query's the PHP script on the server which after performing the request to Twitter returns the data to the application in JSON format. This data is then decoded using JSON\_DECODE and as the Twitter data returns a variety of information not just the text of a tweet it is looped through twice to get the text contents and then drawn to the screen (Appendices 7.3)

With both parts of the Twitter functionality tested and working it proved that the project was feasible to implement and development moved onto implementing mechanics.

#### **4.3.2 Tweet Design**

From meetings with the client and from the background research it was decided that players would create dungeons from tweeting, each tweet will create a room in the dungeon with its location of the dungeon based on the first characters at the beginning of the tweet and the contents of the dungeon in the rest.

The decision to allow users to create a single room at a time with tweets was to allow for user to have a sense of ownership over the room and also the freedom of expression. 2 things that heavily motivate a player to create as found out during the background research (Sotamaa, O. 2003). Both of these were at risk as while the benefits of collaboratively designing rooms together was appealing, it risks making players not want to create content as someone else may change or edit against their wishes.

By creating the dungeon on a room by room basis with each tweet being a room, it allowed the game to naturally foster collaborative design. As any user is free to add rooms to any dungeon. This was done as it was found that co-creators often came together to bring a wide range of different skills (Sotamaa, O. 2010), so by allowing users to create dungeons together it should lead to this with some users who have a skill for creating narrative, adding it to dungeons and others who know how to make challenge rooms working together.

Dungeons were to be laid out in a standard grid like pattern using X,Y coordinates the start of the dungeon would be at 0,0. This was chosen as it allowed to display the rooms of the dungeon very intuitively for the player which is something that is necessary as the whole of the creation process needs to be simple in order to not persuade potential creators (Westecott, E. 2011).

As each tweet will contain the contents of the room, a meaningful way of displaying this needed to be designed. Whilst still staying under the character limit of 140. Inspiration was taken from the game *Dwarf Fortress* (Adams, T, 2006) as well as early MUD (Multi User Dungeon) games. These games couldn't use graphical displays to represent content and instead relied on simple ASCII characters such as the letter 'W' would represent a wall in the game and 'O' would be an Orc. This method of assigning an ASCII character to each thing the user can use to create will give two benefits. First it will mean a lot of content can be put into a single tweet. The second, found out

during research is some users don't create content for a game is due to it being too complicated (Bosch, F. *et al.* 2011), by using this very simple naming structure it should allow users to see what is in the room from looking at it and allow for quick creation of rooms.

One key element of user created content is the freedom and expression that the user gets by being able to make something unique to them (Jansz, J, Theodorsen, J, 2009). In order to enable this to happen the user needs a way of being able to decide on not just the contents of a room but also where the content should go. To do this two numbers in front of each object will denote where the object is in the room on a 5x5 grid. For example 33B would create a bat monster in the middle of the room. While the risk with using this system is that it makes the tweets slightly more complex due to numbers being present, without it the users have very little control over the room and the risk of not having freedom is greater.

The final element that will be part of each tweet is the dungeon identifier this will be two parts both of which will make use of the Twitter '#' (Hashtag) system. A hashtag on Twitter denotes a keyword will follow which can be used to search through the API. It is also used as a way of being trendy with users putting popular hashtags at the end of tweets. The first will be #HashtagDungeon which will be featured on every tweet to denote that it is a tweet for the application, the second will be the name of the dungeon which will be chosen by the user when they create a new dungeon this adds another element of expression for the user.

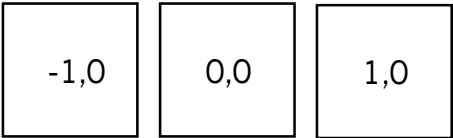
With all these elements combined it will make a tweet that contains all the details to create room. However in order for the application to be able to parse the tweet it needs to know how the tweet is laid out and when each component of the tweet starts and ends. This also still needs to not affect the legibility of the tweet as well. The delimiter separated value technique was used as it is already a widespread method for sorting data in strings (C2.com. 2012). A colon was used to separate each room object so for example a bat

would be :11B: this provides a clear structure and makes the tweets easy to read. A forward slash is used to separate the tweet into its 3 elements Location, Contents, Identifier. The outcome of this can be seen in fig 5



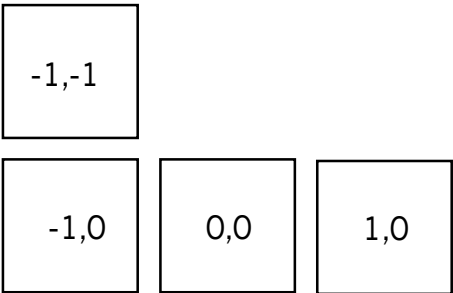
*Fig 5: A sample of 3 tweets creating a 3 room dungeon*

The 3 tweets in Fig 5 when read in by the application will create a three roomed dungeon, the layout of the dungeon can be seen below.



*Fig 6: Adding a room to an already existing dungeon*

When this tweet is posted the next time the dungeon is created it will be amended with the new room and will be displayed like this



Using this method of creating the dungeon layouts it would be possible to create a dungeon of any shape or size by tweeting out enough rooms, this adds another layer of the feeling of ownership the player will have.

#### **4.3.3 Creating Intuitive Tools**

A key problem that was raised from the research was how current creation tool sets are often overly complex for the average user (Westecott, E, 2011). Due to this it prevents everyone from wanting to create content. This is an issue that will be the focus when implementing the in-game editor tools that allow the player to create. The creation of these tools were based on the 4 principles that Fuller created from doing research into content creation tools (Fuller, J, *et al* 2005).

The first of these principles is that the tools must be intuitive to a user without the need for a tutorial or manual. To do this a very minimalistic editor was created.

To create a brand new dungeon from scratch the user can click or touch depending on device the Make a dungeon door(Fig 7).



*Fig 7: The title screen of the application with two options*

When the user clicks on that they are brought to the next screen which provides them with two options to either add on to an existing dungeon or create a new one(Fig 8).





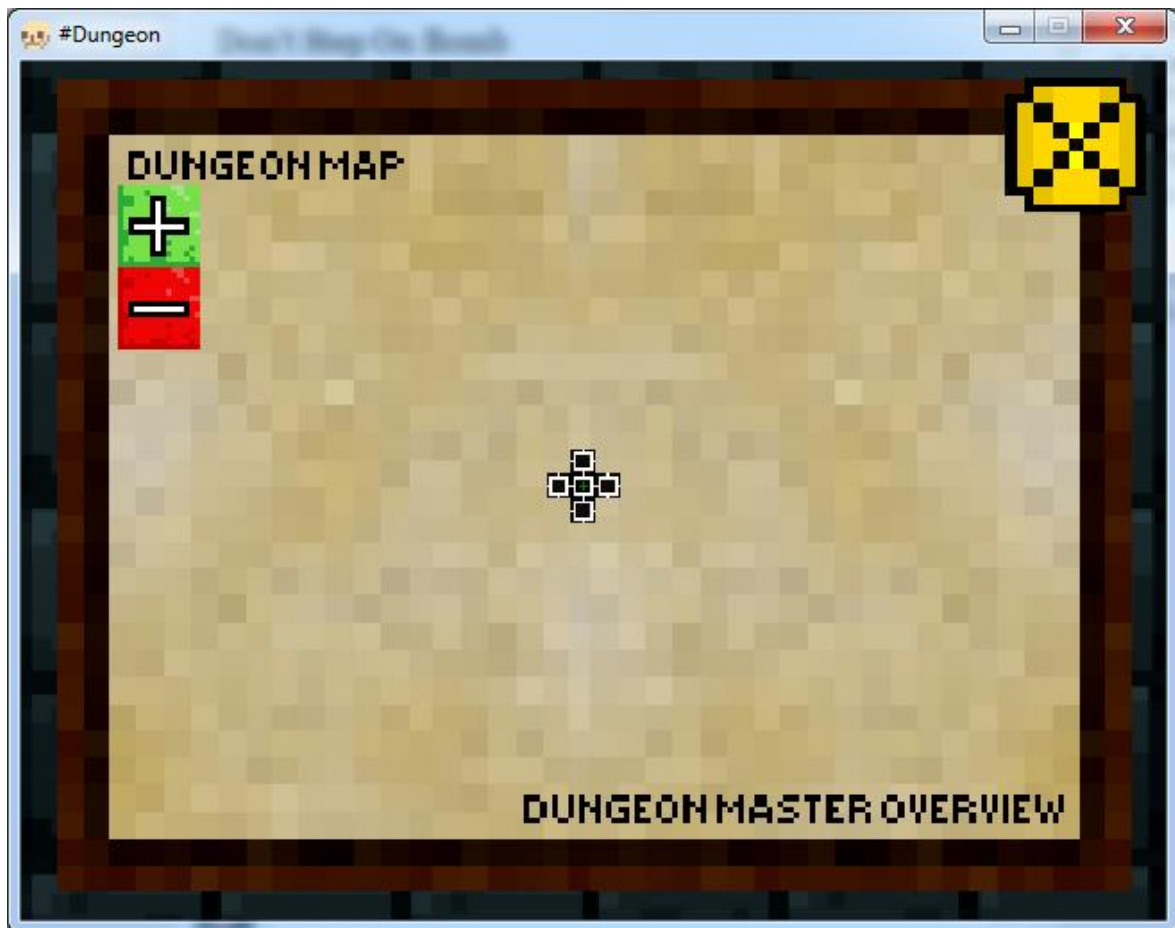
*Fix 8: The player is presented with two options*

If the player wants to create a new dungeon pressing on the “Tweet a new dungeon” button will take them to the final screen of the creation process. On this screen they must name the dungeon and then press tweet and the dungeon will be created (Fig 9). That will post the dungeon to Twitter and it will appear on the dungeon list for everyone else. It was key to make the creation of a dungeon as easily as possible, to make sure it remained true to Fuller, J.’s first principle minimal options are given along the way, and all buttons clearly state what they will do.



*Fig 9: The create a new dungeon screen*

The player also needs to be able to add rooms to a dungeon so the application also had to allow for this. Again it was key to follow the principle set out by Fuller. To follow this again all options are clearly labelled and there is no possible way to create error. When the user chooses to add a room to an existing dungeon they are brought to a list of dungeons from here they are able to select which dungeon they want to add a room too. Once a dungeon has been decided the player must decide where the room will go. (Fig 10).



*Fig 10: Possible room choices pulse to show it's available*

Again on this screen (Fig 10) care has been taken to make it simple and easy, the possible rooms pulsate to show where the player can place their room. The decision to limit the player to placing rooms adjacent to another already existing room only was done so that it would be impossible for new users to create impossible dungeons which leads to it being more new user friendly.

The room creation tool uses a drag and drop method for adding contents to the room (Fig 11) to again make it intuitive you simply click or touch the object they want and then drag it to the desired location. The user then does this for anything else they want in the room and when finished press the tweet button.

Some mechanics have been put in place to again stick to Fuller's first principle in making the tool set easy and intuitive to use for anyone the first

was the room difficulty slider which served to help the flow of the game, this is discussed more in 4.3.5. The objects populate either side of the room layout (Fig 11) will only appear if they are available to be placed in the room, this way is the user see's it they know they can place it in the room. Which should minimise the amount of objects being shown at once preventing from overwhelming the player.



+

**Fig 11:** *The in-game dungeon creation tool.*

The second principle of Fuller's was to provide different options for creating depending on the skill level of the user (Fuller, J, *et al*, 2005). To stick to this principle, two ways of designing rooms for a dungeon are available. The simple method involves the process described above which sacrifices some customisation options to make it simpler for all users. The second method of creating dungeons is through creating Tweets manually outside of the game.

Through this method the user is free to add more complex elements to each room and has greater control in how the finished room will look. As found out from Fuller, J's research it's important to cater to the experience user which this method aim's to do.

The third principle is that there must be a trial and error functionality to allow the users to create and test and from this self-evaluate what they have created and change if they feel necessary. Due to the way that the game is designed by using tweets to make rooms. A user may achieve this by creating a room and trying it, if they do not like then they can delete the tweet and that room is gone and could be remade.

The fourth and final principle by Fuller, J, is to have pre-existing examples of content created with the editor. While this isn't something that was implemented into the game, the principle was met by creating several dungeons using the editor before each focus group which allowed the participants to play and learn how dungeons are constructed from doing so.

Another problem that was found during research was that it was important that the tool or creation make sense in the context of the game (Palosaari, 2011). This wasn't seen as a problem for this application as it is basing its self in the Twitter universe.

#### **4.3.4 Social Mechanics**

In order to evaluate how social integration into core mechanics of the game effect players, Social mechanics need to be designed and implementing based on the findings of the literature review.

The main social mechanic of the game is the collaborative designing of dungeons as mentioned, while creating content alone has been proven to be fun (Trepte S, Reinecke, L. 2010) Collaborative design as the ability to enhance the enjoyment from creating alone (Sotamaa, O. 2010) to enable this social element the game was designed to encourage players to design and create dungeons together. The concept of collaboratively designing dungeons

also gives the players feelings of fellowship one of LeBlanc' s Theory of fun (Hunicke, R., *et al.* 2004).

This core mechanic of building dungeons is naturally social due to the nature of using Twitter as the platform. Everything that the user creates through the act of creating is posted to Twitter. By posting to Twitter any followers see any creations they have made. What this allows is for the expression to be two-folded. The first is the act of expression on a social media site which was found to be a major reason of using them (Guosong, S. 2009) the second is the expression of creating content which again was a main motivation for creators (Fuller, J., *et al.* 2005).

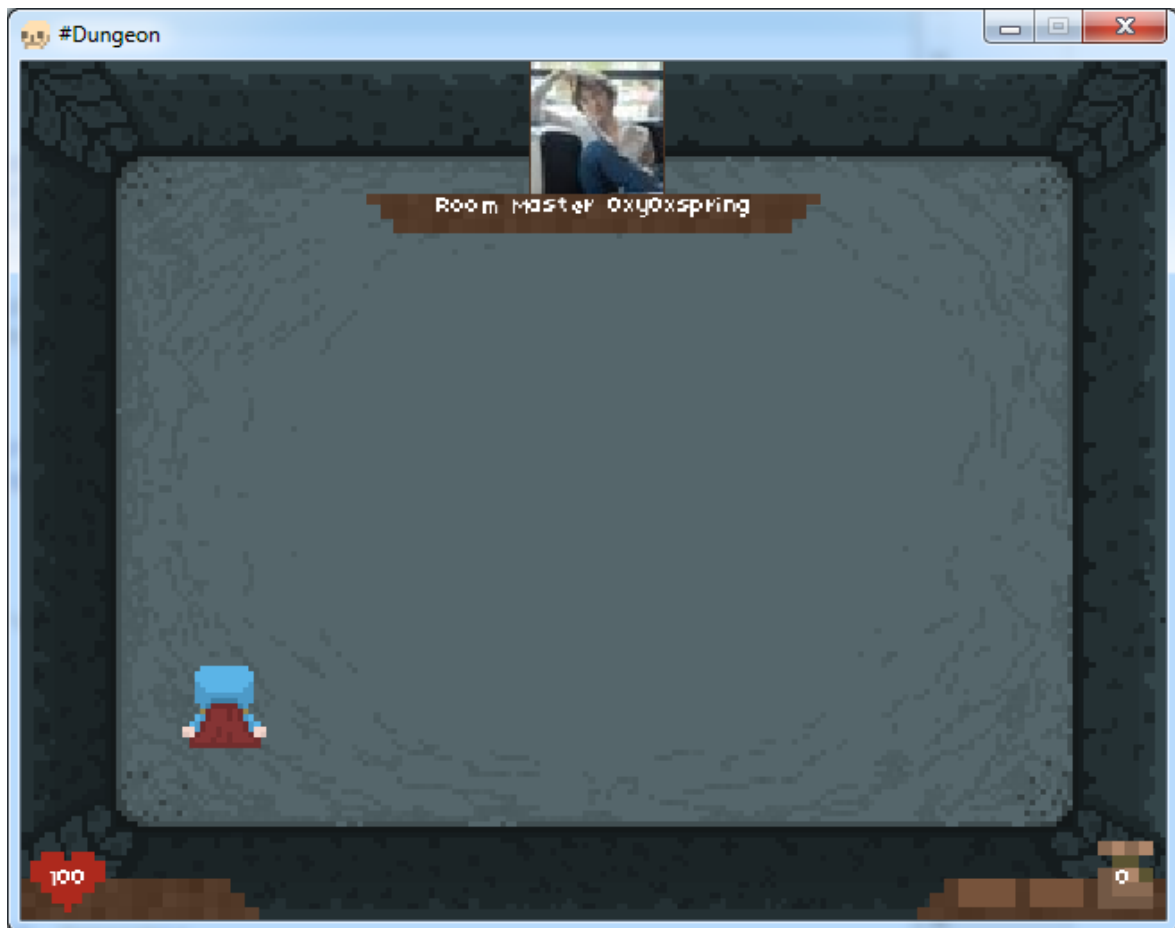
The game has also been designed to act like a Foci as described by (Elklund, L. 2014). A Foci is a communal place that brings social interaction together commonly places like Cafés or Bars Elklund also applied this to games. The game has the ability to act like a Foci due to the nature that a dungeon would become a point of interest with people collaboratively tweeting rooms of the dungeons out together.

From the background research it became clear that allowing players to express themselves in other ways would aid in both creating a more social game but also would allow them to feel more ownership over their creations, something that was found to be important from research (Sotamaa, O, 2010). Using the findings that Haak found a way of enabling the users to create narrative was made (Haak, A, 2012). A player message system was developed which would allow any user to leave messages in the rooms of dungeons. These messages were posted and stored using the users Twitter account (Fig 12). These messages are not just limited to telling narrative but can also be used for chatting to other players.



*Fig 12: An example of a player message*

As previously mentioned the idea of user ownership is important to content creators. It has also shown to be important when co-creating content as well (Sotamaa, O. 2010), To help foster the feelings of ownership of rooms and dungeons when the dungeon tweets are read in it also parses the Twitter handle of the user and their profile pic. The 'room master' aka the creator of the room will have their Twitter handle displayed at the top of each room that they have created. When these names are clicked on the room creators Twitter display picture is displayed (Fig 13). This should help to give not only the creators a greater sense of ownership but also allow players to easily see who is responsible for creating each room.



*Fig 13: Showing the room masters name and display picture*

From implementing a wide range of different social mechanics than complement each other it should leave to a better evaluation of how they affect the player's engagement and involvement with co-creating.

#### **4.3.5 Gameplay and flow**

In order to be able to effectively evaluate how the social interaction elements of the game affect the player it is important to make sure the game is enjoyable for a wide range of player types otherwise results may be misleading due to a player just not enjoying the game.

To do this the game was designed using the information gathered from the research. This included making sure that there were activities for each of the Bartle Player Types as well as Yee's (Bartle, R. 1996) (Yee, N. 2007). To do this there were ways Socialisers could communicate with other players both through and outside the game using Twitter. For Achievers an end goal was



added to each dungeon as a reward. Explorers were catered for by exploring the dungeon and the limits of the creation tool. The Killer type has the monsters in the dungeon to kill but unfortunately no player vs. player combat was featured, as this fell greatly out the scope of the project. These player types were also carried over to the game's editor as both Sotamaa and Jansz *et al* found that creators have similar goal sets to players. (Sotamaa, O. 2003) (Jansz, J, Theodorsen, J. 2009).

It was important to make the creation aspect of the game playful and exciting (Fuller, J, *et al*. 2005), to do this an interesting variety of objects could be placed in a room that could be combined to make traps and mazes to allow the user to have as much customisation as possible.

During the background research the concept of Flow in video games was raised (Mathwick, C. Rigdon, E. 2004), this concept originally developed by Csikszentmihalyi. As discussed in section 2.1.2. To achieve flow in the game the difficulty is balanced for both creating and playing rooms. Rooms near the start when the player is inexperienced have a smaller limit on what can be placed inside them lessening the difficulty of the room. This changes gradually as the user becomes more proficient as makes rooms deeper in the dungeon. This should hopefully lead to gameplay that flows both in the creator and whilst exploring dungeons.

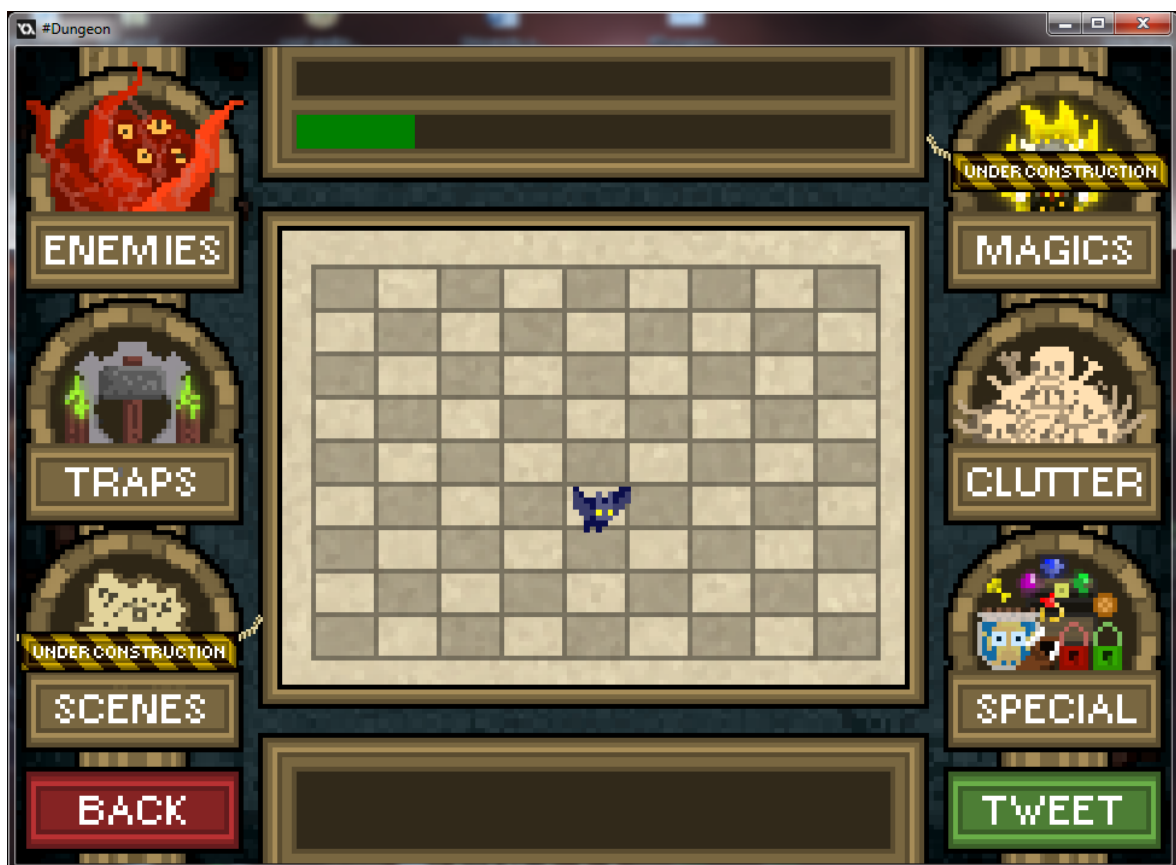
The other theory that was followed during development was LeBlanc's 8 kinds of fun (Hunicke, R., *et al*. 2004). It was important to make sure that the mechanics allowed for these feelings to be felt by the player. Fellowship was already present due to the nature of the game but other elements such as Discovery and Challenge needed to be considered.

#### **4.3.6 Feedback changes**

From the first and second focus group numerous suggestions were made by the participants as discussed in section 5.2.2. As part of the iterative design

process it is important to consider these in order to make the participants become part of the design process (Wright, P. McCarthy, J. 2010).

Participants suggested that a larger grid would allow them more options and varied choices to help make their rooms more unique. This was a really useful piece of feedback as when originally implementing the 5x5 room grid it was done from fear that making it 9x9 may make the room creator too bloated or complicated but none of the participants suggested this as a problem. It was important to act on this complaint as giving user more power over their creations leads to more unique and personalised things which means they should have more engagement with creating (Salen, K. Zimmerman, E. 2013). During the test the creation toolset also had to be explained meaning it failed to be intuitive to all users. To rectify this a new layout was done featuring tool tips and descriptions (Fig 14).



*Fig 14: 9x9 Grid and new creator layout*

Another recurring suggestion that came from the interview with the participants is expert user's wishes for more complex creation tools. Something that was touched on during original implementation when following Fuller's principles (Fuller, J. *et al.* 2005), adding more complex creation tools is risk as it may become too hard for the average user (Westecott, E. 2011). By using Fuller's principle of multiple variations of the tool set the option to add affix's to mobs to change their behaviour was added but only available from creating through Twitter and not the editor. This provides an added benefit of giving expert players an opportunity to explore the limits of the creator as they will not know what affixes exist and will experiment.

## **5. Evaluation**

From aims that were defined in 1.3. A prototype application has been made, the core mechanics of this game are the collaborative user generated content and the social integration throughout. In order to see how these effect player interaction and engagement as well an evaluation needs to be carried out.

### **5.1 Evaluation Methodology**

#### **5.1.1 Mixed Methodology**

The goal of this project was to see in what ways integrating a social media site and collaborative design affect the player's engagement and sense of enjoyment from the game. However measuring 'fun' in games is very hard to accurately do as perception of fun can vary (Jurgelionis, A. *et al.*, 2007).

Because of this a mixed methodology will be used comprising of several different elements rather than just one. This should hopefully lead to a varied selection of both qualitative and quantitative data. To do this the project will be split into several evaluation stages which works well due to the projects already iterative cycle nature from using the scrum methodology.

### **5.1.2 First Iteration**

This project will be split into three iterations of the development cycle with an evaluation taking place after each of them. The first cycle will be to evaluate initial user experiences, to do this a small focus group will be conducted. The participants of this focus group will be already existing gamers as this is the first iteration of the project it may not be as intuitive as necessary for non-gamers, a consent form will be required to be signed for ethical reasons (Appendices 7.4). The contents of the focus group will be to have the participants play a premade dungeon following Fuller's 4<sup>th</sup> principle (Fuller, J. *et al.* 2005) and then to create rooms for new or existing dungeons. After a group discussion will take place discussing aspects of their experience and providing feedback. The results of this will then be used to populate the wish list of the next scrum sprint.

### **5.1.3 Second Iteration**

The second sprint will be concluded again with a small focus group of different participant's to the first to allow for more varied user feedback. This will be used to test any changes made from the first focus group, due to it being the second iteration of the development the game should also be near fully functional at this point which will allow the users to freely create. The tasks for this group will be the same as the first with the exception that after the tasks are complete they will be free to continue playing and creating at their leisure. After they have had some time to reflect on the game one-on-one personal interviews will be conducted to allow for some qualitative data. Throughout the duration of the focus group observational notes will be made on player interaction with the social elements.

For the in-depth interview several starter questions will be user but follow up questions will be generated based on the answers of the participant this is to allow for a more natural flow to the interview and to make it feel less formal. The starter questions are as followed

- How do you feel about the social elements of the game?

- Do you have any preference on exploring or creating dungeons?
- What do you think of the collaborative designing of dungeons?

From these two focus groups enough qualitative data will be gathered and analysed.

#### **5.1.4 Final Iteration**

The final test of the project will be larger compared to previous tests. The purpose of this test will be two-fold the first is to obtain player metrics from the participants which will then be analysed to see if the play styles match the expected play from the research, the player metrics data that is obtained from this test will allow for the defining of play persona's and analysing of play (Canossa, A. Drachen, A. 2009). The other will be to get feedback on player experience which will help to evaluate the effects of the social and co-creation elements, this will be done using the PENS questionnaire discussed in detail below.

To gather a varied range of participant's an online sign up form was used (see Appendices 7.5). This was then advertised through Facebook and Twitter allowing anyone with an interest to sign up. This will allow to effectively evaluate if the creation tools are truly intuitive for casual or unexperienced gamers. The structure of this test will not be structured and instead the participants are free to play the game however and whenever they wish, for as little or as much time as they want over the period of the four day test. This will aim to mimic a players real play patterns which will lead to more realistic player metrics being recorded.

Due to the fact that some of the participant's may be non-gamers a game guide document that will be sent out with the game has been created (Appendices 7.6). Detailed in the document is basic play instructions and how to create content.

After the test is over the PENS (Player Experience of Need Satisfaction) survey will be sent (Appendices 7.7) to the players to fill in. The PENS survey has

been picked as it is a tried and tested way of measuring user engagement and satisfaction with a game (Ryan, R. *et al.* 2006). By using an already existing evaluation survey it helps to make sure that the results obtained are accurate and reliable. The PENS survey is split into five sections each evaluate a different aspect of gameplay.

- Competence
- Autonomy
- Relatedness
- Presence/Immersion
- Intuitive Controls

Each of these sections contains a series of statements that the user must mark on a Likert scale of 1-7 on how much they agree. The weighting of the number varies for each question. While all five will be analysed the Relatedness and Intuitive Controls part of the survey will help to evaluate the main aims of the project. There are several rules for deployment of the PENS survey that will need to be followed these can be seen in Appendices 7.7.

## **5.2 Evaluation Results**

### **5.2.1 First Evaluation**

The first focus group was done early on in the projects lifecycle to get some early feedback on the Twitter features of the game as well to invite the user to be part of the design process (Wright, P. McCarthy, J. 2010). A problem with this is that due to it being so early on in the lifecycle several critical bugs were present when the focus group began, and due to poor planning other issues appeared.

For the focus group the participants were giving several tasks to do alone but were free to talk to each other and see what other participants were doing

whilst being observed. 8 Participants were present for the focus group and were first introduced to the game and then given the task to play through a premade dungeon on the game.

However due to the volume of Twitter requests that were being given during the focus group after a couple minutes of this task the firewall of the computers the focus group was being tested on blocked all requests from the game meaning the participants were not able to complete this task and the focus group was brought to an end after a small closing interview. The firewall issue could have been avoided by better planning and is something that was taking into consideration for the following development cycles. The results from the first focus group were still very useful as a number of game breaking bugs were found that were added to the wish list to be fixed in the next sprint.

### **5.2.2 Second Evaluation**

The second focus was a greater success then the first one since many of the game breaking bugs and the connection issue were fixed it allowed the participants to focus on playing the game and giving feedback. For this focus group the participants were gain given the same tasks to first play though a premade dungeon and then given the chance to create their own. After this they were free to play though other participants dungeons or continue creating. Once the test was over an in-depth individual interview was conducted.

### **5.2.3 Task Observations**

#### **Task 1**

The first task the participants were asked to do was to play through the dungeon in order to familiar themselves with the game. From the study it was very apparent that the users experienced all of the 8 kinds of fun in this short session. With Fellowship and Discovery being the two most dominant, although expression was also displayed.

Very early on in the task one player realised they could leave messages in the rooms after seeing one of the default messages placed in the dungeon beforehand. At this point the player exclaimed that he left a message in the second room which prompted the other participants to then go and check the message. A very strong element of fellowship came from this and the participants continued to leave messages some of them being intentionally humorous. After a participant had posted a message a short while after when another player discovers it and read it out loud the group laughed. A competitive element was observed throughout this task with participants asking each other what room they were in and if they had killed the end of the dungeon boss yet, and a pseudo race was on to kill the boss first. With the first participant to do so shouting "*First*".

The concept of Twitter spam was raised during this task with one participant who had posted several messages during the task saying "*I haven't posted anything to Twitter in months and now I'm spamming it trash talking monsters*". This concept of Twitter pollution was raised during the first focus group and is also raised later on in this discussion, in both the second task and in the post group interview where it will be talked about in more detail.

## **Task 2**

The second task that was given to the participants after they had all completed and finished the first task was to create their own dungeon using the in game editor and Twitter. They were told to log into their Twitter accounts in order to be able to post tweets and were given the option to opt out of this for privacy reasons if they so wished.

One participant was so eager to start making dungeons that they actually started this task before being given it, and spent the most time creating their dungeon in the session. Which is interesting as it brings up 2 different player types that is discussed in the post interview section. The intuitiveness and the ease of access of the system seemed to be very easy with some participants building their dungeons with no assistance at all, while one participant had to



have the details explained to them.

Some participants were very quick to try and test the limits of the editor and the game by trying to place objects in the way of the doors preventing the game from being completed or by trying to experiment with objects that shouldn't go in places, for example one participant tried to put rocks in front of all the doors to a room leading the player to be stuck in the room forever. This type of griefing behaviour is to be expected and should not be discouraged as griefing is a valid player type (Kirman, B. *et al.* 2012). Although limits should be place so it doesn't cause major disruption to the other player in this case forcing a game restart.

Another point of interest is that participants often tried to maximise the amount of items allowed in a room trying to keep the difficulty bar full each time and adjusting the monsters in the room to allow for a max bar. For example in the session a player deleted a slime monster as it was preventing them from capping the bar and replaced it with several bats ending with the bar being at 100%. This min/maxing tactic is similar to what is seen in MMO's (Whang, L. Kim, J. 2005) and is interesting as in this case it was taking precedence over the players design decisions or at least affecting them. When asked about this by another participant their answer was "*Every room has to be maxed out or I've just wasted my time*".

One of the participants was quick to bring up the Twitter spam issue again during this task after they had just tweeted a series of rooms to create their dungeon. Another participant joined in at this point saying how they had 2 tweets before this and now they have 12. When one participant was finished with creating their dungeon they looked over their Twitter feed and exclaimed "*People are guna think I've been hacked*". This will be discussed later in the Twitter pollution section.

The concept of player ownership and expression was observed during this task with one player who wanted to test dungeons before they were ready

being told off by another participant saying *"It's not ready yet you can play it when I'm done"* it was at this stage as well people realised that they could add to anyone else's dungeon which caused the participants to pose the question if that dungeons could be locked in some way so that only the original creator could add to it. Which is something that wasn't expected from the proposal.

One of the goals of this study was to see if it was intuitive and user friendly to create dungeons and the results show that it was on the whole easy to make dungeons. With participants creating dungeons without help what so ever and creating unique experiences from this with the design options given. However there was some initial problems with some participants not understanding how to make a room or the context of the room's location. A more major problem was frustration was observed in participants when the room editor didn't look the same when in the actual game causing some participants design decisions to be rendered pointless.

### **Third Task**

The third and final task that the participants were asked to do was to play each other's dungeons or if they wished continue creating dungeons. The observations made during this task were some of the most interesting with all 8 kinds of fun being displayed. The most abundant thing that was observed was the different social elements at work as the players were going through each other's dungeons. One player enjoyed watching other people play though the dungeon that they had created so much so that he stopped playing the game and just watched people trying to go through his own. An element of comrade was also displayed with the same participant also encouraging a participant as he was playing through the dungeon cheering him on and giving words of advice, this also included laughing that the same player when they died in a panic from being overwhelmed.

Players also learned of new ways to use the creation tools from experiencing other participants work *"That's an amazing Idea, I'm going to make more*

*rooms like that.*" From one player when they saw another participant creatively use the tool make traps. After playing through each other's dungeons discussion broke out with each of them giving feedback and praise to each other and talking about what tactics worked well for both creating and clearing dungeons. Participant 1 said how they were not entirely happy with their dungeon as they were experimental with the rules of the game and it didn't turn out how they had imagined it would. A lot of compliments were given to Participant 2's dungeon as they used the message system to leave messages for the player creating a new narrative existing in the game to help immerse players in their dungeon. This type of behaviour was designed to occur after researching it in the literature review. The Twitter message system seemed to be very popular with this focus group with them all using it to talk to each other through dungeons and to brag about clearing rooms.

After the task was over the participants were free to play the game for a while if they wanted to or they could leave all participants actually opted in to playing the game again. Participant 2 went right back to creating dungeon citing that he had some "*really cool*" ideas for a new dungeon whilst the other participants went back to play through rooms.

An interesting thing that emerged from this was the players started a competition between themselves. First they tried to clear each room without taken any damage in a dungeon and then racing to the end of the dungeon the winner being whoever got finished it with the most health left. This is interesting as the competitive element of creating and clearing dungeons had not been heavily considered and no features were implement to facilitate this but the players created it anyway.

During the time that the participants were being competitive, the participant that chose to continue on creating dungeons had finished his new one and asked the other players to give it a try. The participant was really eager to see how the other players react to the dungeon they had made. The participant then talked the other players through the dungeon explaining their design

decisions.

The idea of player ownership is an important factor in creating user generated content and throughout the focus groups players repeatedly referred to their dungeon as 'my dungeon' which is important as they are themselves expressing that it is their own creation and they feel attached to it. During the design of the artefact a lot of thought was put into creating mechanics that add player ownership but the focus group still had ideas for more ways to increase the ownership one participant suggesting to add a room description on Twitter.

The concept of Twitter pollution was again raised during the task when a participant took a break from playing the game to look at Twitter and exclaimed "*I have just done a lot of tweeting*".

#### **5.2.4 Post Group Interview**

After the focus group was over I performed some brief one-on-one interviews with each of the participants. This was opted to be done over a questionnaire to allow for more lucid responses from the participants leading to better qualitative data. The questions for the interview were based on what the participants said and evolved to keep it a natural conversation. Several key things were found during these interviews.

All of the participants really enjoyed the integrated Twitter aspects and said how they feel it makes the game 'more alive' when you can see the dungeon list updating as new rooms/dungeons are made. One of the goals of the project was to see if using a Twitter based creator with simple tools would make it easy for everyone to create content, one participant said "*I feel it is an innovative way to include casual or non-gamers*" when asked about how the Twitter aspect works.

One point of interest that was risen by several of the participants from the interviews was a preference for either creating or playing, none of the

participants said that they enjoyed both equally and instead favoured one *“My favourite part is creating dungeons”*. This may be because of certain users will be of a player type that isn't interesting in creating.

Participants also seemed to enjoy the collaborative elements of designing a dungeon. With one stating their favourite part of the game was *“Being able to build a dungeons as a collective”*.

What is interesting is that all 3 of the participant's from this focus group did not use Twitter prior to playing the game but 2 now say they use it daily after playing the game. This could lead to the game actually increasing the user base of Twitter by making people understand it rather than just aware.

When asked for feedback on changes to make to the game to allow for more creativity and social expression two common answers arose. The first was to make the grid in the rooms larger to allow for a greater variation of possible options. The second was to add a way to rate rooms or dungeons so that creators would have a way of knowing how well their room was received. The implementation of these features is discussed in section 4.3.6.

### **5.2.5 Final Evaluation**

53 unique player metrics were recorded from the final test. Several of these sets of data were removed due to their total play time being under 100 seconds which would provide outlying results, as they didn't participate for very long the results gathered would skew the data. This data raw data can viewed in Appendices 7.8

8 Different stats were recorded for during the test.

- Time Exploring Dungeons
- Time Creating Dungeons
- Time Total
- Rooms Made

- Rooms Cleared
- Deaths
- Messages Sent
- Social Check

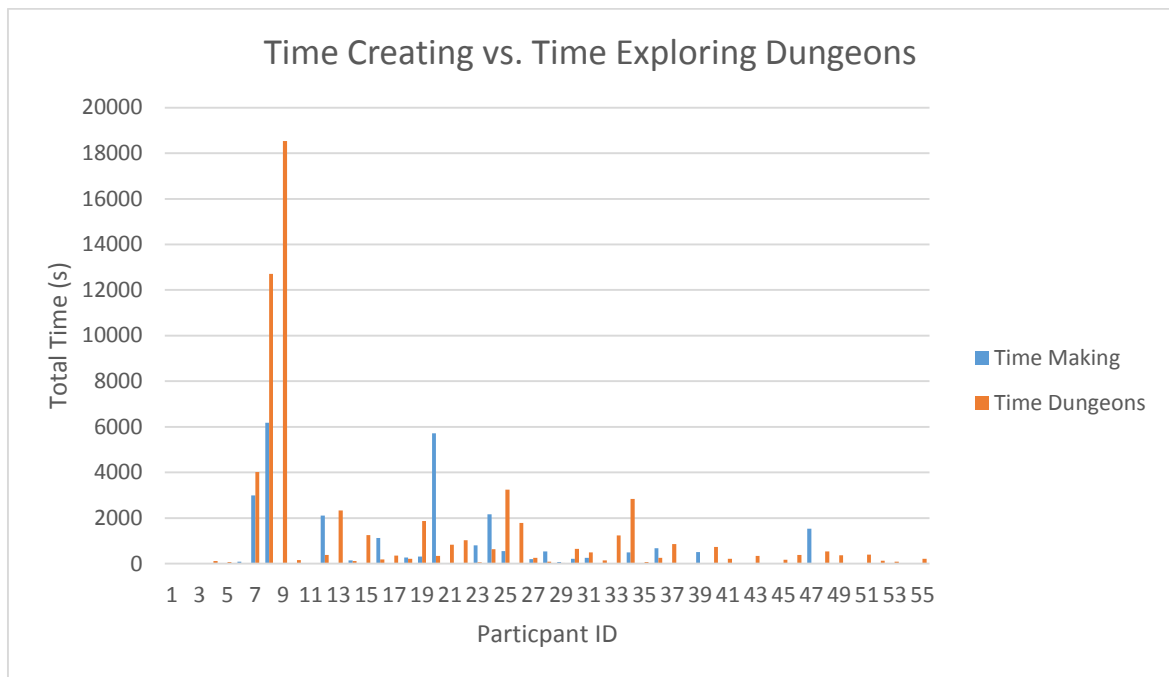
Stand ard	Time Ex- ploring (Sec- onds)	Time Creating (Sec- onds)	Total Time (Sec- onds)	Rooms Made	Rooms Cleared	Deaths	Mes- sages Sent	Social Check
Deviat ion	836.111 8286	527.377 0789	6615.07 3618	9.7766 729	37.9242 67	1.60416 1255	1.8275 667	2.81365 7169
Aver- age	1293.02	573.47	5788.21	7.00	72.45	2.49	2.51	4.21

**Table 2:** *Standard Deviation & Average (Mean) for each metric*

From looking at the standard deviation (Table 2) of the data it is clear that there is a very large spread of data. The cause of the spread is due to what could be considered ‘Hardcore’ players (Bartle, R. 1996), who spend a much higher amount of time playing the game compared to the average player. This is good though as it shows that game appeals to both audiences.

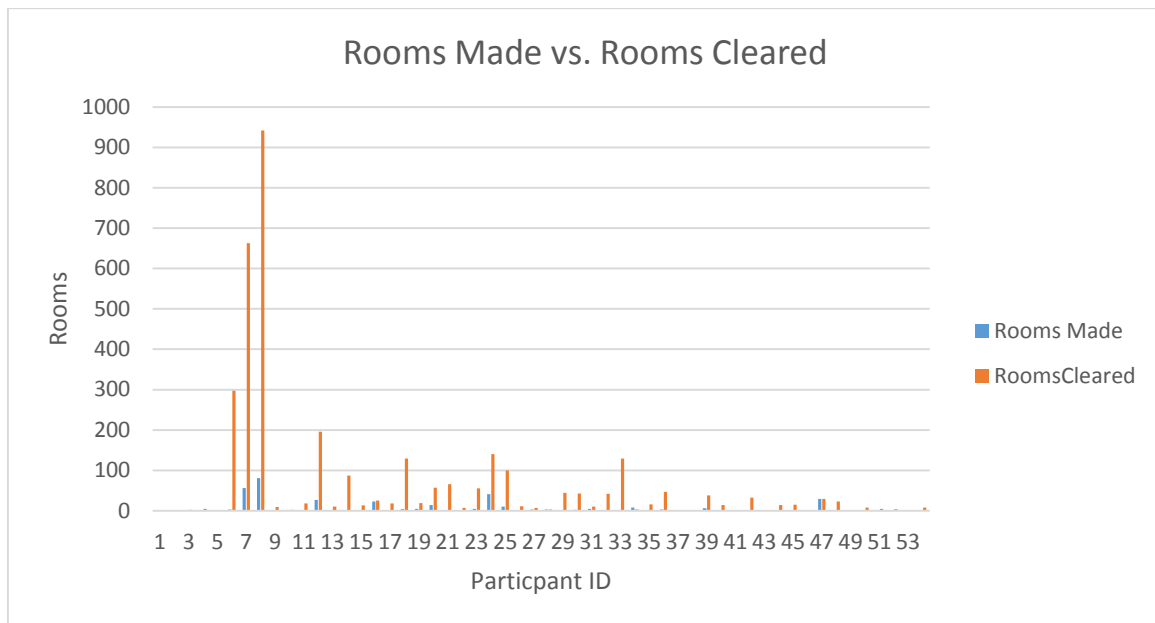
One metric that was stored was the use room rating and message system, 27 players of the 46 players did not use these at all. It’s interesting as the game has a heavy social focus as its core mechanic that over 50% of the player base didn’t use the extra social elements that the game provides. This could be of course due to these players just having no interested in socialising and instead fall under the “Killer” or “Explorer” of Bartle’s player types (Bartle, R, 1996). This is also backed up by the fact that 26 players didn’t create rooms at all and focused only on exploring the dungeons.

Players who did choose to create dungeons though, did always create more than one room. With the average being 7 rooms per player. This helps to show that the project was successful in creating an intuitive creation tool and retains the ease of use that Twitter naturally has.



**Fig 15:** Graph showing time creating vs. exploring dungeons

In the graph in Fig 15 you can see the data for how much time was spent creating and playing. Participants were assigned a unique ID when their metric's were recorded starting at 1 and incrementing as each new player played the game. What this graph visualises is that players who started playing early on in the tests played the game for a greater amount. This could be because near the start of the test people were playing simultaneously which meant new dungeons were showing up on the list each time which in turn persuaded people to create. This data also links into what was discovered from the interviews from the second focus group where participants said they favoured one or the other.



**Fig 16:** Total rooms created vs. explored.

As expected from that fact that users spent more time creating rooms also lead to them creating a larger quantity (Fig 16). What this graph does show is that every player played more rooms then they created. This could be an extension of what Fuller was saying with his principle for tools to have pre-existing levels available (Fuller,J, *et al.* 2005). From this it is assumed that players cleared several rooms in order to have a better understanding of the game to then allow them to feel more proficient at creating.

After the test was over participant's were sent an online version of the PENS questionnaire to complete. 20 out of 53 participant's filled out this survey. The lack of response could be due to the fact the survey was conducted after the test had concluded. For the results see Appendices 7.9

The results from the Competence section of the show that players felt highly competent at the different aspects of the game. One of the main aspects of maintaining flow in game is to make sure that the challenge is apt for the players. For the question "*My ability to play the game is well matched with the game's challenges*" the mean answer was 5 with 7 being strongly agree on this question. This shows that by tapering the difficulty and limiting how hard



rooms could be near the start of the dungeons it creates a feeling of flow. The results of the other statements from this section also lead to this conclusion.

The second section of the survey deals with player autonomy. The results from this were very positive with participant's agreeing with the statements of having interesting options and freedom in the game. It can be suggested that this is because of the content that players created thus giving the other players more content to consume lead to them feeling that there was lots. One of the key motivations of creators as found out in the background research was having freedom (Sotamaa, O. 2003), the mean for this statement was 5.1 with 7 being strongly agree.

The relatedness section of the PENS is of particularly importance as it will help to evaluate how the social features of the game actually affected the players. The first 2 statements in this section deal with how the player feels close to other players. The results show that players did not feel as if they had made friends from the game with the mean results being just above 3. This could be because of the lack of being able to talk directly to other players and that messages don't show. The results for the third statement though do show that they disagreed with the statement "*I don't feel close to other players*" with the average being 4.05 with 7 in this case being strongly disagree. This shows that when playing the game the players are aware that the content is made by other players and feel connected to them through this.

What is interesting is that the results of the Immersion/Presence portion of the survey results were very neutral. With players disagreeing with feeling immersed statements. This could be due to the strong presence of the social features, these could bring players out of the game as seeing the Twitter handle and profile picture of a creator could be jarring breaking immersion. Players did feel a sense of accomplishment from clearing rooms in the dungeon. This could be due to that fact they know another player has created it so they feel like they have bested the other player similar to the motivation of the 'Killer' player type Bartle defined (Bartle, R. 1996).

The last section of the PENS survey is the intuitive controls section. The results for this were really positive with statement 1 and 3 having an average above 6 and statement 2 just under 6. The standard deviation was also very low compared to the rest of the survey meaning that all the participant's found it intuitive to make and play through dungeons. One objective of the project was to see if Twitter would make a good interface for design, the PENS results suggest that it can make an intuitive tool. It also has the benefit of advertising any content a user creates allow more people to be aware when a user has created something. It does have a major limitation in the 140 character limit.

## **6. Conclusions**

The aims of this project was to design and develop a game that allows users to collaboratively design content together using social media as the platform. The first aim to investigate if user generated content affected player base retention and engagement. From the background research it was found that users had a series of motivation for both playing and creating with player types by both Yee and Bartle being used for designing the game to appeal to them. From the evaluation it would seem that by combining these two elements it makes for engaging gameplay.

This conclusion comes from all the evaluation stages. In the interviews participant's repeatedly said how they enjoyed using Twitter in this context and that it was fun to 'build a dungeon as a collective'. The player metric data suggests a direct link to player engagement being higher when multiple players were playing simultaneously. The results from the PENS survey also correspond with what was discovered during the interviews that the novel social element of Twitter makes for an engaging game.

The second aim of the project was to develop an intuitive way to allow players of any skill level to create content within Twitters 140 character limit. The

design of this was informed from the previous research by Fuller and Westecotte (Fuller, J. *et al.* 2005) (Westecott, E, 2011). By designing based on the principles Fuller suggested when creating the creation tool set it has led to an intuitive creation pipeline. The results from the evaluation evidence this with the results from the PENS survey scoring strongly on the intuitive section and the player metrics showing the mean amount of rooms created by players was 7. These results suggest that this aim was a success and the inherited ease of use of Twitter carried over to designing and that by following Fullers principles it an intuitive creation tool was designed.

The other two aims of the project were based around implementing the artefact and creating a way for players to be able to collaboratively add to it based on the literature review findings. The design and implementation of these features was successful. By researching and gaining an understanding of a players motivations to both create and play it allowed the game to be designed around these motivations. The mechanic to create one room at a time was done to make sure users had self-expression that couldn't be overridden by someone else as this was found to be a problem in the literature review.

The evaluation overall lead to suggestions that integrating social and co-design mechanics into one game can increase the player's engagement of the game. Through creation of the application it can be concluded that it is possible to create intuitive creation tools that anyone can use by leveraging the power of how easy to use social media is. From all this it can be concluded that the project fulfilled all of its aims.

## **6.2 Future Work**

As the project was on a strict time constraint some features were opted to not be implemented. Further customisation options could be added to the creation tools without too much risk of making the editor too complicated. As the process is already streamlined adding more options shouldn't have too much of a negative effect. The way that the Twitter data could also be

optimised more as currently each player makes a separate call to Twitter it would be much quicker to instead do one call every minute and store the results and pass these on.

Due to the nature of the project having users post their content to Twitter the idea of the game was intriguing to many with several gaming news sites requesting to ask questions on both the social and collaborative design elements. From this it is clear that there is an audience waiting for games that use social media beyond what the normal games do by integrating the core of the game to it. Research could be done into other social network sites and games could be designed around this.

Another possible avenue for the project could be teaching computational thinking to children. This idea was raised by a Twitter user after seeing tweets from the game and learning about it. Due to the way that the game structures the Tweets it could be applied in an educational sense.

### **6.3 Critical Reflection**

The project as a whole on reflection I would consider a success, the aims and objects set out at the start of the project were all completed and were sensible in the scope of the project. The game was designed and developed with out to much trouble. The evaluations results were similar to what was expected from the background research

At the beginning of the project it was hard to find suitable research related to the effects of collaborative design which held the project back for a while as it was difficult to get a suitable direction for the project. However once the focus had been shifted to motivations of players creating it allowed for a clear goal to be defined for the project which greatly helped the project proceed.

Due to the project requiring the use of the Twitter API a way of being able to interact with it needed to be developed that was with in my skill limit. This also needed to be found out before the project fully went underway as it was such a key objective of the project that without, it wouldn't work. To solve a

basic understand in PHP was learned as this appeared to be the easiest way to interact with Twitter. Thankfully this was a success and led to the rest of the technical implementation being fairly easy.

Throughout the designing stage of the game it was a struggle to limit the mechanics implemented, as this was for an experiment any gameplay features that were implemented needed to have a reason based on the background research. Due to this it made designing a fun game very challenging, but a lot was learned about player motivations and mechanics that help feature them.

Time keeping for the project was fine and the project finished on schedule although this was due to the buffers. The buffers were put into place in case some parts of the project overran their estimated times shown on the Gantt chart (Appendices 7.1). Which happened for most of the stages of the project. Although due to the buffers it didn't have as large of a knock-on effect that it would have had if they were absent.

While a mixed methodology approach was taken for the evaluation it still sided more with the HCI side of evaluation and because of this lacks a large amount of the quantitative data other than the player metrics recorded in the final test there isn't any. This is something that could be improved upon. Due to time constraints the evaluation wasn't as thoroughly as it could have been it could be expanded to include another test where the participants play a version of the game without any social features but still has collaborative design then another version with social features but not collaborative design from this it would be easier to assess what affect each of these aspects had on users.

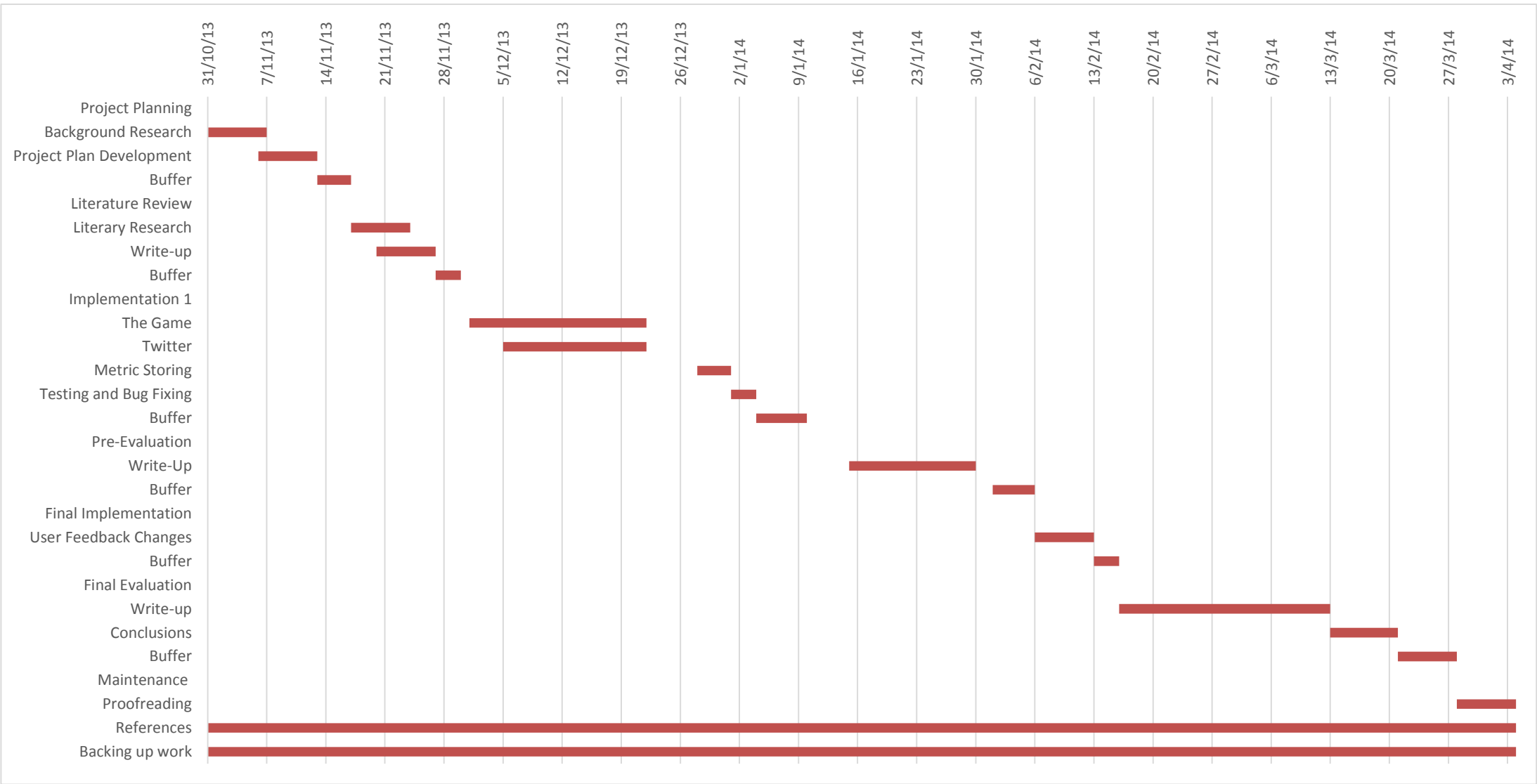
Another point of improvement would be that a large portion of the time was spent on implementing the game and making sure it was as bug free as possible. While this led to a positive testing experience for the participants in retrospect it would have been better to spend the time elsewhere on the project and deal with a few bugs.

An issue with planning the tests also arose for the first focus group, and a valuable lesson was learned from it. Due to the fact that the test took place on University computers when several users started playing the game at once it flagged the firewall to block all access. This meant the test had to end early, although this could have been avoided by planning and consulting with the lab technician beforehand.

However despite the problems that arose I feel as if they all provided good learning experience that helped the sequential steps of the project. I feel the project was successful on the whole.

## **7. Appendices**

7.1 Gantt Chart



## 7.2 Raw Tweet Data

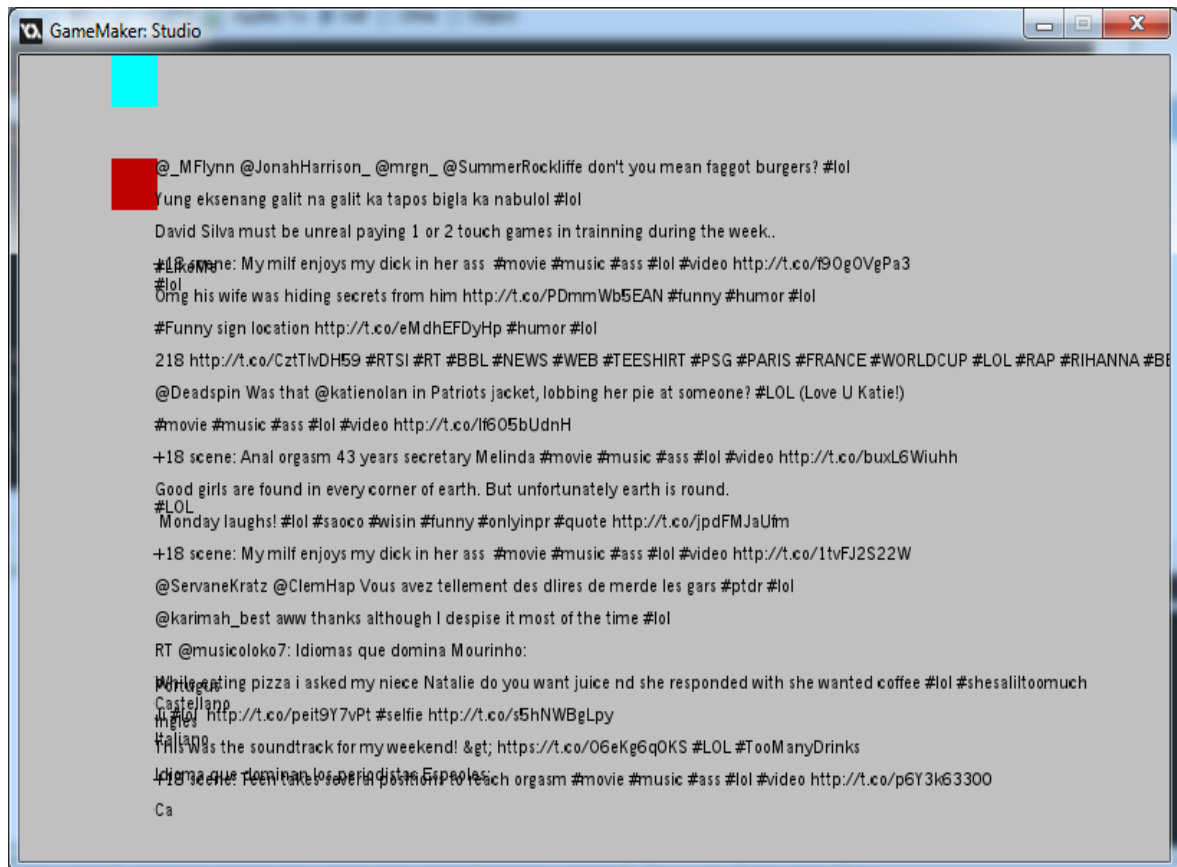
```

{"status":{"metadata":{"result_type":"recent","iso_language_code":"en"},"created_at":"Thu Apr 24 04:02:40+0000 2014","id":"459180598624391168","id_str":"459180598624391168","text":"@OxyOxpring @HashtagDungeon the bottom right looks creepy. The top left looks wise"},"source":"web","truncated":false,"in_reply_to_status_id":"459040967933558784","in_reply_to_status_id_str":"459040967933558784","in_reply_to_user_id":"354419300","in_reply_to_user_id_str":"354419300","in_reply_to_screen_name":"OxyOxpring","user":{"id":"234482705","id_str":"234482705","name":"Colleen Wilson","screen_name":"spazchickens","location":"Alpine CA","description":"Co-owner at Adversary Games.Half artist half programmer, Making 3 games Simultaneously.Mother.Lucid dream fanatic #indievdev #gamedevrnhhttps://t.co/hVonRNf1oa","url":"http://t.co/hVonRNf1oa","entities":{"url":{"url":"http://t.co/hVonRNf1oa","expanded_url":"https://www.facebook.com/adversarygames?ref=br_rs","display_url":"facebook.com/adversarygames/u2026","indices":[0,22]},"description":{"url":{"url":"https://t.co/hVonRNf1oa","expanded_url":"https://www.facebook.com/adversarygames?ref=br_rs","display_url":"facebook.com/adversarygames/u2026","indices":[135,158]},"protected":false,"followers_count":1122,"friends_count":874,"listed_count":74,"created_at":"Wed Jan 05 19:33:24+0000 2011","favourites_count":2462,"utc_offset":-25200,"time_zone":"Pacific Time (US & Canada)","geo_enabled":false,"verified":false,"statuses_count":9139,"lang":"en","contributors_enabled":false,"is_translator":false,"is_translation_enabled":false,"profile_background_color":"28233D","profile_background_image_url":"http://pbs.twimg.com/profile_ba","hashtags":[],"symbols":[],"urls":[],"user_mentions":[{"screen_name":"OxyOxpring","name":"Sean 'Oxy' Oxspring","id":"354419300","id_str":"354419300","indices":[0,12]},{"screen_name":"HashtagDungeon","id":"1965271802","id_str":"1965271802","indices":[13,28]}],"favorited":false,"retweeted":false,"lang":"en"},"metadata":{"result_type":"recent"},"created_at":"Wed Apr 23 20:15:28+0000 2014","id":"459063022917398528","id_str":"459063022917398528","text":"@OxyOxpring @HashtagDungeon 'Fu Granchu'","source":"Twitter for Android</a>"},"truncated":false,"in_reply_to_status_id":"459040967933558784","in_reply_to_status_id_str":"459040967933558784","in_reply_to_user_id":"354419300","in_reply_to_user_id_str":"354419300","in_reply_to_screen_name":"OxyOxpring","user":{"id":"89087747","id_str":"89087747","name":"Jody Macgregor","screen_name":"jodymacgregor","location":"Brisbane, Australia","description":"I am like Andrew W.K. if you replace partying with reading things on the internet. Freelance writer and editor. co-host of @ZedGamesAU","url":"http://t.co/Z8EptHZZp","entities":{"url":{"url":"http://t.co/Z8EptHZZp","expanded_url":"http://jodymacgregor.tumblr.com","display_url":"jodymacgregor.tumblr.com","indices":{"0,22}}},"description":{"url":{"url":"http://t.co/Z8EptHZZp","expanded_url":"http://jodymacgregor.tumblr.com","display_url":"jodymacgregor.tumblr.com","indices":{"0,22}}},"protected":false,"followers_count":351,"friends_count":257,"listed_count":12,"created_at":"Wed Nov 11 02:39:04+0000 2009","favourites_count":388,"utc_offset":36000,"time_zone":"Brisbane","geo_enabled":false,"verified":false,"statuses_count":6288,"lang":"en","contributors_enabled":false,"is_translator":false,"is_translation_enabled":false,"profile_background_color":"131516","profile_ba","hashtags":[],"symbols":[],"urls":[],"user_mentions":[{"screen_name":"OxyOxpring","name":"Sean 'Oxy' Oxspring","id":"354419300","id_str":"354419300","indices":{"0,12}},{"screen_name":"HashtagDungeon","name":"HashtagDungeon","id":"1965271802","id_str":"1965271802","indices":{"13,28}}],"favorited":false,"retweeted":false,"lang":"en"},"metadata":{"result_type":"recent","iso_language_code":"en"},"created_at":"Wed Apr 23 19:53:14+0000 2014","id":"459057428576079872","id_str":"459057428576079872","text":"@OxyOxpring @HashtagDungeon bottom right","source":"TweetDeck</a>"},"truncated":false,"in_reply_to_status_id":"459040967933558784","in_reply_to_status_id_str":"459040967933558784","in_reply_to_user_id":"354419300","in_reply_to_user_id_str":"354419300","in_reply_to_screen_name":"OxyOxpring","user":{"id":"2202116256","id_str":"2202116256","name":"Big Fire Games","screen_name":"bigfiregamesuk","location":"Sheffield UK","description":"We just released our first #android game!! https://t.co/OdKygesYHn","url":"http://t.co/m1BBJk4tB","entities":{"url":{"url":"http://t.co/m1BBJk4tB","expanded_url":"http://www.bigfiregames.co.uk","display_url":"bigfiregames.co.uk","indices":{"0,22}}},"description":{"url":{"url":"https://t.co/OdKygesYHn","expanded_url":"https://play.google.com/store/apps/details?id=com.bigfiregames.getoffmyvegg","display_url":"play.google.com/store/apps/det/u2026","indices":{"43,66}}},"protected":false,"followers_count":619,"friends_count":1342,"listed_count":15,"created_at":"Mon Nov 18 23:04:36+0000 2013","favourites_count":151,"utc_offset":null,"time_zone":null,"geo_enabled":true,"verified":false,"statuses_count":572,"lang":"en","contributors_enabled":false,"is_translator":false,"is_translation_enabled":false,"profile_background_color":"BADCFD","profile_ba","hashtags":[],"symbols":[],"urls":[],"user_mentions":[{"screen_name":"OxyOxpring","name":"Sean 'Oxy' Oxspring","id":"354419300","id_str":"354419300","indices":{"0,12}},{"screen_name":"HashtagDungeon","name":"HashtagDungeon","id":"1965271802","id_str":"1965271802","indices":{"13,28}}],"favorited":false,"retweeted":false,"lang":"en"},"metadata":{"result_type":"recent","iso_language_code":"en"},"created_at":"Wed Apr 23 19:22:58+0000 2014","id":"459049811585826816","id_str":"459049811585826816","text":"RT @OxyOxpring: So can anyone on #IndieDevHour help me choose what this @HashtagDungeon creature should be? We're still not sure: http://t.co/u2026","source":"TweetDeck</a>"},"truncated":false,"in_reply_to_status_id":"459049811585826816","in_reply_to_status_id_str":"459049811585826816","in_reply_to_user_id":null,"in_reply_to_user_id_str":null,"in_reply_to_screen_name":null,"user":{"id":"1965271802","id_str":"1965271802","name":"Hashtag Dungeon","screen_name":"HashtagDungeon","location":"Lob Land","description":"Created by @Kieran_Hicks and @OxyOxpring. Delve into dungeons generated using @twitter tweets! Can you survive the perilous depths of #Dungeon?","url":"http://t.co/4qtMdpTTBI","entities":{"url":{"url":"http://t.co/4qtMdpTTBI","expanded_url":"http://www.hashtagdungeon.com","display_url":"hashtagdungeon.com","indices":{"0,22}}},"description":{"url":{"url":"http://t.co/4qtMdpTTBI","expanded_url":"http://www.hashtagdungeon.com","display_url":"hashtagdungeon.com","indices":{"0,22}}},"protected":false,"followers_count":308,"friends_count":24,"listed_count":5,"created_at":"Wed Oct 16 18:08:58+0000 2013","favourites_count":50,"utc_offset":null,"time_zone":null,"geo_enabled":false,"verified":false,"statuses_count":387,"lang":"en","contributors_enabled":false,"is_translator":false,"is_translation_enabled":false,"profile_background_color":"1A1B1F","profile_ba","hashtags":[],"symbols":[],"urls":[],"user_mentions":[{"screen_name":"OxyOxpring","name":"Sean 'Oxy' Oxspring","id":"354419300","id_str":"354419300","indices":{"0,12}},{"screen_name":"HashtagDungeon","name":"HashtagDungeon","id":"1965271802","id_str":"1965271802","indices":{"13,28}}],"favorited":false,"retweeted":false,"lang":"en"},"metadata":{"result_type":"recent","iso_language_code":"en"},"created_at":"Wed Apr 23 18:47:49+0000 2014","id":"459040967933558784","id_str":"459040967933558784","text":"So can anyone on #IndieDevHour help me choose what this @HashtagDungeon creature should be? We're still not sure: http://t.co/0BFxODmC"},"source":"TweetDeck</a>"},"truncated":false,"in_reply_to_status_id":null,"in_reply_to_status_id_str":null,"in_reply_to_user_id":null,"in_reply_to_user_id_str":null,"in_reply_to_screen_name":null,"user":{"id":"0BFxODmC","id_str":"0BFxODmC","name":"","screen_name":"","location":"","description":"","url":"","entities":{"url":{"url":"","expanded_url":"","display_url":"","indices":{"0,0}}},"description":{"url":{"url":"","expanded_url":"","display_url":"","indices":{"0,0}}},"protected":false,"followers_count":0,"friends_count":0,"listed_count":0,"created_at":"","favourites_count":0,"utc_offset":0,"time_zone":"","geo_enabled":false,"verified":false,"statuses_count":0,"lang":"","contributors_enabled":false,"is_translator":false,"is_translation_enabled":false,"profile_background_color":"","profile_ba","hashtags":[],"symbols":[],"urls":[],"user_mentions":[]}}}}

```



## 7.3 Test Application Twitter Feed



## 7.4 Consent Form

# Hashtag Dungeon Focus Group Consent Form

**Study Administrator: Kieran Hicks**

The purpose of this study is to find out more about how users feel and interact with Twitter when used in a collaborative design environment.

To research this an observation based study will be taking place during this focus group which requires the filming of the participants. You may opt out of this by requesting it. The video capture from this focus group will be destroyed at the end of the projects life.

A variety of player metrics will also be recorded during the session any information collect from this protects your anonymity as its only raw numbers. This data will also be destroyed at the end of the project.

You are free to stop the test at any point if you wish to no longer continue and you may request your data to be removed at any point.

### Statement of Informed Consent

I have read the description of the study and the rights I have as a participant. I voluntarily agree to be part of this study.

**Participants Name:**.....

**Participants Signature:**.....

**Date:**.....

## 7.5 Sign up form

### Hashtag Dungeon Test Sign Up Sheet

I am going to be running a test build for Hashtag Dungeon soon. This is a form where you can register for being part of my final test for my final year BSc project at the University of Lincoln.

\* Required

**What is your full name? \***

**What is your email? \***

**Are you over 18 years of age? \***

- ☐ ☐ Yes
- ☐ ☐ No

**Do you have a Twitter profile? If so, what is your name?**

**In addition to a PC test build would you like an Android version?**

- ☐ ☐ Yes

### Research Data Collection

I will be recording information on what you're working on in the game for academic research into collaborative game design as well as to make the final game better. The data you have given on this form will also be stored for research and so that you can be contacted with a download link for the game. It will not be shared with anyone. Player metrics will be recorded, recording how long you are spending making, designing and playing dungeons, the amount of dungeon rooms you create and play through and deaths and usage of the social features. All data recording when you are playing will be stored in a secure online database for research purposes and is anonymous. The data obtained might be published in my dissertation and elsewhere for academic purposes but will be anonymous. All the data recorded is completely anonymous and you are free to opt out of it being stored on request. You may also request to have it deleted at any time by emailing at [KieranCHicks@gmail.com](mailto:KieranCHicks@gmail.com)

**I understand and am happy with my data being recorded: \***

- ☐ ☐ Yes

○ ☐ No

## 7.6 Game Guide Document

### #Dungeon Test Group

Thank you for signing up to be part of the test group for #Dungeon. The purpose of this study is to find out more about how interact with Twitter when used in a collaborative design environment, data will be gathered from this. This data will be based on your game statistics comprising of, Time spent playing the game, amount of dungeons created and played through and the usage of the social functions.

All of this data will be anonymous and you have the right to opt out at any point by sending an email to [KieranCHicks@gmail.com](mailto:KieranCHicks@gmail.com). This data will be destroyed at the end of the project.

The test will run over the course of the weekend ending on Tuesday. Feel free to play as much or as little as you like of the game during the course. There are no NDA's so you are free to talk about the game.

### About the game

Hashtag dungeon is a dungeon crawler that allows users to collaboratively create and explore dungeons by using Twitter.

As this build of #Dungeon is a early look at a non finished game a lot of features are missing and the game is susceptible to random crashes and bugs happening. If this does occur a restart of the game should fix most problems and it would also be great if you could forward the bug report to me([KieranCHicks@gmail.com](mailto:KieranCHicks@gmail.com)) with context of what you were doing. This of course is optional and not expected of you. I would be very grateful though.

### Contact

As mentioned before if you have any queries or bug reports please feel free to contact me through one of these methods.

**Email:** [KieranCHicks@gmail.com](mailto:KieranCHicks@gmail.com)

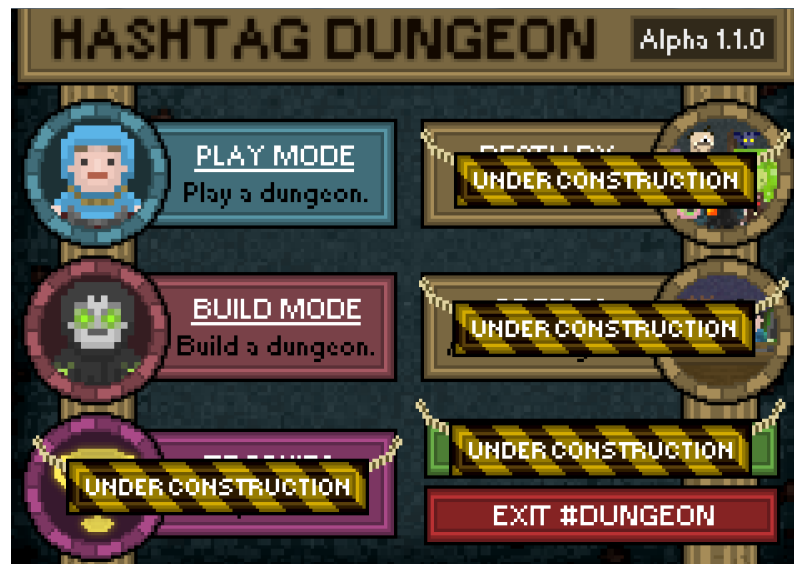
**Twitter:** @Kieran\_Hicks

**#Dungeon Forum:** <http://www.indiedb.com/games/hashtag-dungeon/forum>

### Guide to Playing the game

As the Game is still in development it is currently lacking a tutorial so instead a game guide has been created.

When you first start the game you will be greeted with this screen. By clicking the Play Mode it will take you to the list of current dungeons. Build mode will take you creating a new or existing dungeon. And exit of course will close the game.

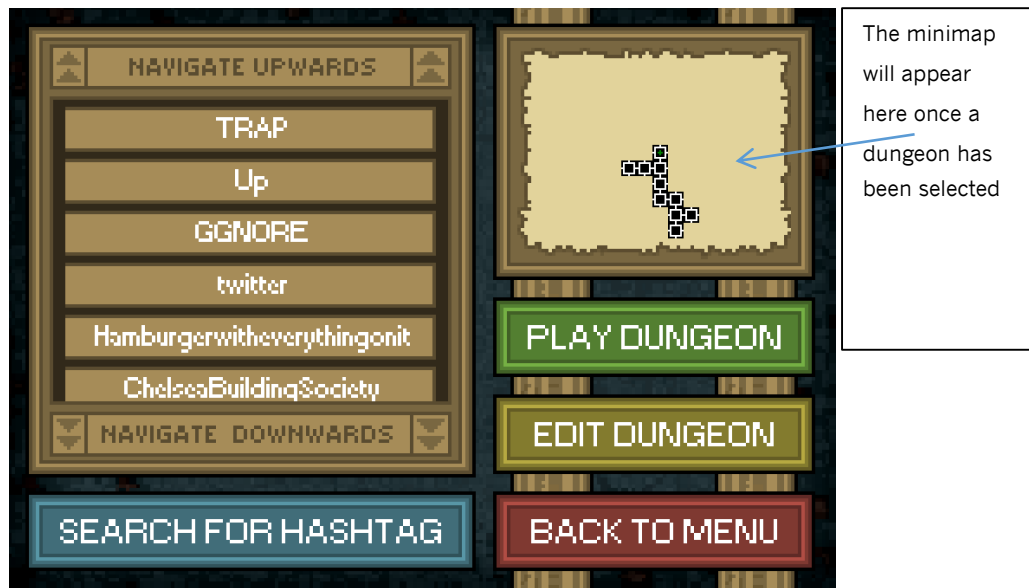


This is the Dungeon List screen and will be displayed if you pressed the Play Mode or Choose to edit and existing dungeon. On this screen you can see a list of the recent dungeons depending on the current popularity of dungeons there may be only a couple displayed or many the Navigate buttons above and below can be used scroll up and down the list. Tapping or clicking on one of the dungeons names will load the mini-map up.

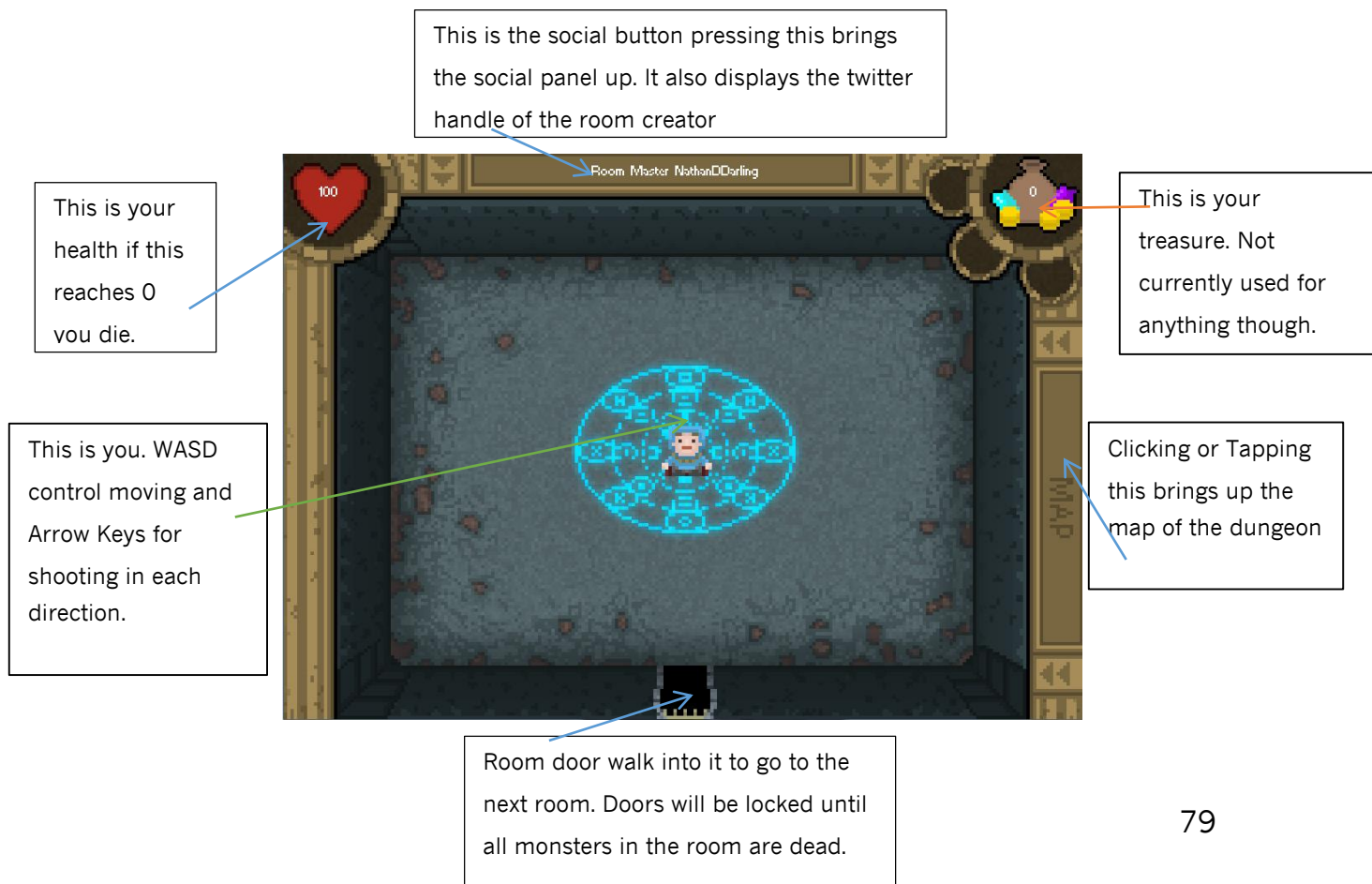
You can use this button to search for an already existing hashtag dungeon that isn't on the list for example "TestingFungeon" No # needs to be included.

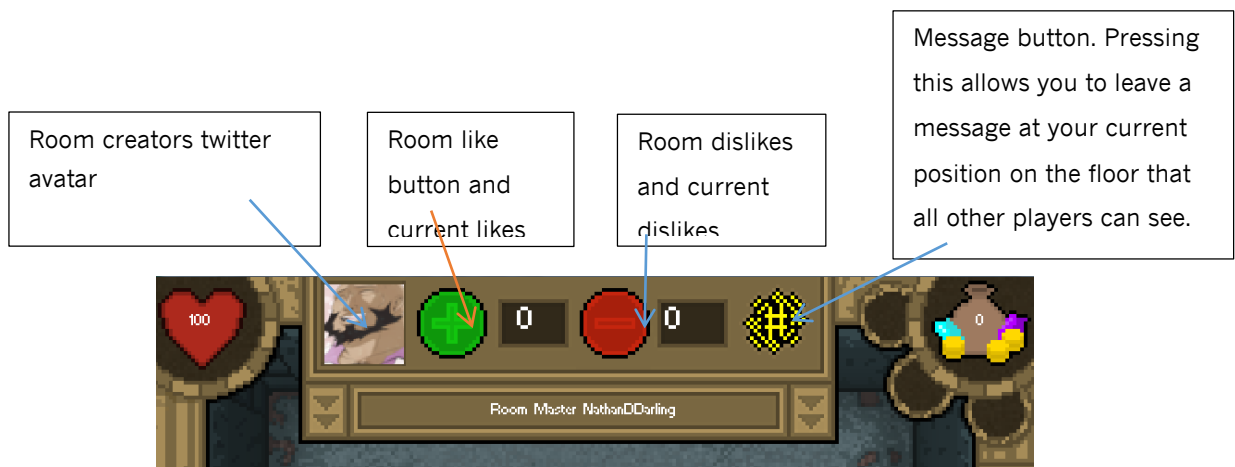


Once the minimap has loaded you can then select to either Play Dungeon which will load the dungeon up to play or Edit Dungeon which will allow you to add a room to an already existing dungeon.



If the Play Dungeon option then the dungeon you selected will be loaded and you will be present with the main game screen. The goal of this part of the game is to clear every room in the dungeon which will then spawn a portal in the starting room to allow you to fight the boss of the dungeon.





If you pressed on build mode then you will be taken to the screen below here you can choose to make a new dungeon which will take you to that option or edit existing dungeon which will take you to the Dungeon List screen.



This is the create a new dungeon screen enter in the name of what you would like your dungeon to be called and then press tweet. This will take you out the game and to Twitter where you will have to confirm your post. The game does not have permission to post to your Twitter without your approval.



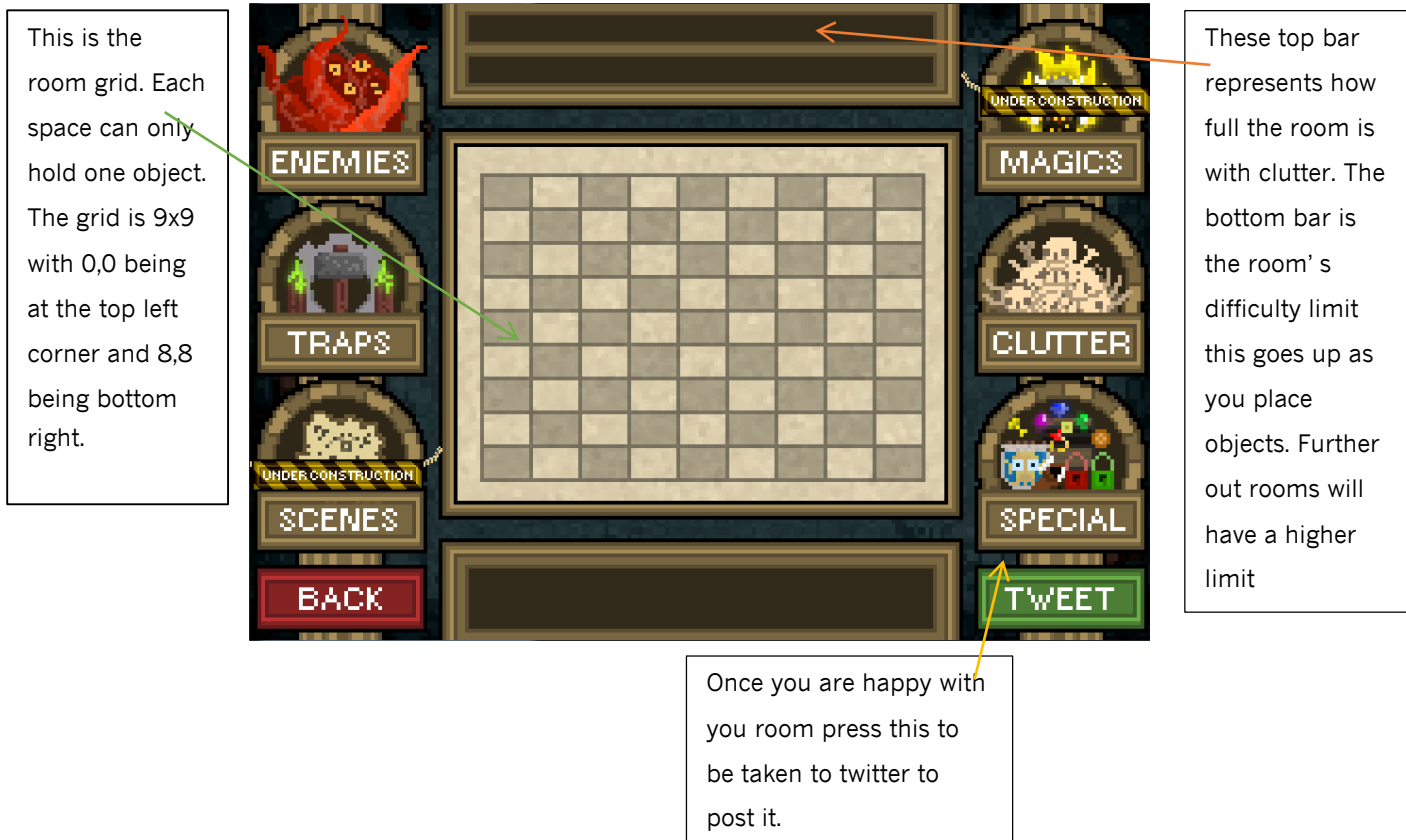


This is the room selection screen which is brought up when you choose to edit an existing



dungeon. On this screen you can select where you want to add a room to the dungeon by clicking on any of the rooms that are pulsating which will take you to the room editor.

This is the Room editor which provides a visual aid to designing rooms. The buttons to the side can be pressed which will bring up a grid of objects that can be placed relating to that category.



If you have any problems please don't hesitate to contact me.  
Thanks again for signing up and helping me with my dissertation. Have fun exploring and creating dungeons!

## 7.7 PENS Survey

### PENS v1.6 – Subscale Scoring

#### Administration Guidelines:

- Respondents typically rate their level of agreement to each item using a 7-point Likert scale (1= Do Not Agree, 7=Strongly Agree);
- All items are weighted equally in scoring;
- Items are randomized in their order when presented to participants;
- Reverse-scored items are indicated by “(-)”;
- Questions are framed by the following stem:

**“Reflect on your play experiences and rate your agreement with the following statements:”**

#### PENS: Competence

Reflect on your play experiences and rate your agreement with the following statements:

1. I feel competent at the game.
2. I feel very capable and effective when playing.
3. My ability to play the game is well matched with the game's challenges.

#### PENS: Autonomy

Reflect on your play experiences and rate your agreement with the following statements:

1. The game provides me with interesting options and choices
2. The game lets you do interesting things
3. I experienced a lot of freedom in the game

#### PENS: Relatedness

Reflect on your play experiences and rate your agreement with the following statements:

1. I find the relationships I form in this game fulfilling.
2. I find the relationships I form in this game important.
3. I don't feel close to other players. (-)

#### Presence/Immersion

1. When playing the game, I feel transported to another time and place.
2. Exploring the game world feels like taking an actual trip to a new place.
3. When moving through the game world I feel as if I am actually there.
4. I am not impacted emotionally by events in the game (-).
5. The game was emotionally engaging.
6. I experience feelings as deeply in the game as I have in real life.
7. When playing the game I feel as if I was part of the story.
8. When I accomplished something in the game I experienced genuine pride.
9. I had reactions to events and characters in the game as if they were real.

#### PENS: Intuitive Controls:

1. Learning the game controls was easy.
2. The game controls are intuitive.
3. When I wanted to do something in the game, it was easy to remember the corresponding control.

## 7.8 Player Metrics

User	Time In Dun- geons	Time Making	Time To- tal	Rooms Made	Rooms Cleared	Deaths	Mes- sages	Social Check
0	0	0	329	0	0	0	0	0
2	120	0	152	0	2	0	0	1
3	74	0	94	0	5	0	0	0
5	4020	82	13385	3	297	9	3	9
6	12704	2996	47386	56	663	17	21	24
7	18541	6175	70164	81	942	27	77	104
8	151	0	5386	0	9	0	0	0
9	19	0	152	0	2	0	0	0
10	379	0	700	0	18	0	0	6
11	2337	2115	10010	27	196	6	2	3
12	122	0	188	0	10	0	0	0
13	1258	150	12011	1	87	6	1	3
14	184	0	268	0	13	1	0	0
15	349	1121	2646	23	25	2	0	2
16	215	0	239	0	18	0	0	0
17	1877	272	3267	4	129	5	0	0
18	342	314	6002	5	19	1	0	4
19	833	5721	9359	14	57	4	2	4
20	1022	0	1403	0	66	2	1	8
21	53	0	195	0	7	0	0	0
22	638	797	2456	5	55	3	0	0
23	3253	2166	27632	41	140	3	9	13
24	1781	554	3860	10	100	2	0	1
25	262	0	333	0	11	1	0	0
26	88	200	891	3	7	0	0	0
27	27	539	1173	3	3	0	0	1
28	649	73	1362	0	44	3	0	0
29	499	209	1274	2	43	0	0	0
30	150	252	1246	5	10	1	0	0
31	1232	0	20821	0	42	2	0	0
32	2839	3	8558	0	129	7	0	3
33	74	497	1152	8	3	1	0	0
34	253	0	427	0	16	0	0	0
35	855	672	3058	3	47	3	0	5
38	733	508	1760	6	38	2	2	2
39	212	0	4059	0	14	1	0	0
41	344	0	456	0	32	1	0	0
42	0	0	36	0	0	0	0	0
43	169	0	239	0	14	1	0	0

44	385	0	1123	0	15	0	0	0
46	532	1535	4725	29	29	0	0	0
47	375	0	586	0	23	3	0	0
49	400	0	565	0	8	2	0	4
50	123	0	188	0	5	0	0	1
51	89	0	181	0	4	1	0	0
53	210	2	549	0	8	0	0	0
STAN DAR D DEV	836.1118 286	527.3770 789	6615.073 618	9.7766 729	37.924 267	1.604161 255	1.8275 667	2.813657 169
Aver- ages	1293.02	573.47	5788.21	7.00	72.45	2.49	2.51	4.21

## 7.9 PENS Results

### Competence

1. I feel competent at the game	2. I feel very capable and effective when playing.	3. My ability to play the game is well matched with the game's challenges.
5	5	6
6	6	6
5	5	7
7	7	7
6	6	7
5	6	5
6	7	7
7	6	6
6	5	5
5	6	6
5	5	6
4	5	5
7	7	7
5	3	5
5	5	3
6	3	5
3	2	2
4	3	3
5	5	5
1.06513	1.448936	1.464991
5.1	4.85	5.15

## Autonomy

1. The game provides me with interesting options and choices	2. The game lets you do interesting things	3. I experienced a lot of freedom in the game
6	7	6
7	7	6
6	6	7
5	7	4
5	6	5
6	7	6
6	7	6
6	6	5
6	6	6
6	7	5
6	5	6
6	6	6
7	7	6
6	6	5
6	7	7
2	2	4
2	2	1
5	5	5
3	6	6
1.460994	1.523692	1.342077
5.1	5.6	5.1

## Relatedness

1. I find the relationships I form in this game fulfilling.	2. I find the relationships I form in this game important.	3. I don't feel close to other players.
2	2	2
5	4	3
4	4	5
6	4	1
5	6	5

6	6	6
4	4	2
4	4	4
2	2	7
4	5	5
3	3	4
4	4	3
4	2	7
2	2	5
5	3	3
2	3	4
2	3	7
2	3	5
3	2	3
1.382852	1.263523	1.758854
3.45	3.3	4.05

## Presence/Immersion

1. When playing the game, I feel transported to another time and place.	2. Exploring the game world feels like taking an actual trip to a new place.	3. When moving through the game world I feel as if I am actually there.	4. I am not impacted emotionally by events in the game.	5. The game was emotionally engaging.	6. I experience feelings as deeply in the game as I have in real life.	7. When playing the game I feel as if I was part of the story.	8. When I accomplished something in the game I experienced genuine pride.	9. I had reactions to events and characters in the game as if they were real.
4	1	1	3	5	1	3	3	1
4	3	4	4	4	3	6	7	3
6	5	5	3	5	2	4	7	5
3	3	3	1	4	6	1	7	3
2	2	2	2	2	1	1	5	2
5	5	4	6	7	4	5	7	6
5	6	5	4	4	2	4	4	4
4	4	4	4	4	4	4	4	4
5	4	2	2	2	2	2	6	2
6	4	3	4	5	3	4	6	5
3	1	1	2	2	2	5	4	4
2	5	3	3	1	1	1	4	1
4	4	4	5	5	3	3	5	3
2	2	2	2	2	4	2	6	2
2	2	2	3	5	3	5	6	4

1	1	1	5	2	2	1	3	1
2	5	5	2	1	1	1	4	1
2	1	2	4	2	1	1	2	2
6	5	6	4	5	4	4	6	5
1.609548	1.66842	1.523692	1.293257	1.711673	1.387075	1.699673	1.544657	1.580214
3.4	3.15	2.95	3.15	3.35	2.45	2.85	4.8	2.9

## Intuitive Controls

1. Learning the game controls was easy.	2. The game controls are intuitive.	3. When I wanted to do something in the game, it was easy to remember the corresponding control.
7	7	7
5	6	6
6	5	7
7	7	7
7	7	7
7	7	7
7	7	7
7	6	7
4	3	6
6	7	7
6	6	7
7	7	7
6	6	6
7	4	7
5	5	6
7	6	7
7	7	7
7	7	7
7	7	7
0.901591	1.167293	0.418854
6.1	5.85	6.45



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