Interaction-Centred Design: Doing Ethnography for Gamification Design

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Abstract

This research explores the situated methods involved in gathering and using ethnographic data to design the player focus elements of a system architecture for a gamified domestic energy conservation device.

While substantial scholarly and industry methodological literature for interaction design and gamification exists, the explicit steps necessary to link ethnographic user data to actionable design architecture elements are often glossed. For example, in design process flow charts, arrows are often used to connect data collection and persona creation without explaining how such a link is practically achieved. In this research an ethnomethodological approach is used to respecify the creation of player focus elements of personas, scenarios, and stages of mastery from resources for a gamified architecture into topics of analytical interest.

Target user data were gathered through telephone interviews and in-home observation and then analysed in terms of both the empirical practices of users and my own practices in explicating user practices and transforming them into player focus design elements. The two-part analysis allowed the activity of doing ethnography for gamification design to be operationalised by firstly doing the activity and then second by describing the accounts that both construct and demonstrate the activity.

The first finding is that telephone based interview questions provide interactional opportunities between designers and users. These opportunities provide content that can be thematically analysed through structural analysis of how respondents engage in the question-answer process. The telephone interview, then, provides for interviewee-orientated concepts that are derived from both content and structural themes.

The second finding is that while in-home observation provides ‘more’ data, that data does not substantially add much in terms of content themes. However, it does change the perspective of what the interviewer can reflexively achieve. In that regard, the important extra detail that in-home data collection achieves is interviewer-oriented in terms of the ability to look for otherwise unreported issues or to confirm or disconfirm interview reports. While the material is still participant-focused, the practice of revealing the data is researcher initiated in ways that would be difficult to replicate via the telephone. It is also
found that in-home observation provides the richest data when there are collaborative resources around which the interviewer and interviewee can discuss user activities.

It is concluded that gamification design choices can be interaction-centred and empirically grounded in interviewee-oriented data from telephone interviews. The same can be achieved from in-home gathered data, but the real value of in-home is the ability to gather interviewer-oriented data which can confirm or disconfirm reports. The added value of in-home data would be the collaborative ability that can be achieved by being face-to-face with participants.
Declaration by author

This thesis is composed of my original work, and contains no material previously published or written by another person except where due reference has been made in the text. I have clearly stated the contribution by others to jointly-authored works that I have included in my thesis.

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List of Abbreviations used in this thesis

CSCW Computer Supported Cooperative Work

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<tr>
<td>EM</td>
<td>Ethnomethodology</td>
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<tr>
<td>HCI</td>
<td>Human-Computer Interaction</td>
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<td>UCD</td>
<td>User-Centred Design</td>
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1 - Introduction and Literature Review

The overall focus of this research is to analyse how ethnographic methods can inform the Player Focus section of a Gamification design architecture for domestic energy conservation.

This focus was borne out of necessity as, externally to this research in a professional setting, I am working to develop a gamified platform to encourage domestic electricity conservation backed by Queensland State Government funding. This project required me to learn various aspects of interaction design in order to make empirically grounded design choices for the intended system.

Being a novice designer, I decided to turn to research and industry literature around interaction design in order to achieve an understanding of how it is accomplished. This revealed that there is detail in the situated action of doing Gamification design (introduced in section 1.3) which has not yet been addressed from a research perspective. More specifically, the detail that is under addressed in the literature involves the steps necessary to take information about potential system users and develop it into actionable knowledge in order to inform the design of a system (section 1.4.3). This provided an area of research for my dissertation, concerned with unpacking how design is informed from user information, with a live case-study with which to frame the work. This provided an environment of “unique adequacy” (Garfinkel and Rawls, 2002) which allowed me, as the researcher, to examine the setting from a practical manner, rather than simply theorising (Wakefield, 2000).

Gamification is the concept of applying game mechanics in a non-gaming context in order to motivate people (Deterding et al., 2011). The goal of Gamification is to encourage specific behaviours that would otherwise be repetitive and mundane by making them fun and enjoyable. Gamification achieves its goal by applying game design and game thinking around the desired activity by including the addictive elements from gaming that motivates participation.

Designing an effective gamified system requires a strong focus on identifying and understanding the intended users or as gamification industry and academic literature calls them ‘players’ of the system. This ‘Player Focus’, introduced in-depth in section 1.3.3.1, is used to guide the designers by providing a representation of who end users will be, how they might use the system, and how they progress through the system.

As the following literature review argues, from section 1.1 onwards, current research in Gamification has not yet focused on the specific methods used to construct the Player Focus section of a Gamification architecture. That is, what are the steps a designer takes to transform user data into actionable Gamification design resources? This is not a criticism of Gamification research,
more, it is identifying an underexplored area in Gamification research to which this dissertation contributes.

Since ethnography’s inception in interaction design its methods have been used to provide a rich understanding of the social contexts in which technology and users co-exist. Early work by Lucy Suchman pioneered the use of ethnographic methods and ethnomethodological analyses in interaction design, in what Crabtree (2004 p 195) dubs the “turn to the social”. This shift from engineer designed systems to more user-centred approaches focuses around “the real users and their goals, not just the technology” (Sharp et al. 2007, p 425).

Debate exists as to what constitutes design ethnography and how best to employ these methods in a design context (Dourish, 2007 p 1). This debate, albeit insightful, does not easily differentiate which specific methods are used in the process of doing ethnography for interaction design. This, from a novice perspective, makes it difficult for a new designer to understand what can be done to achieve ethnography for design. This debate is more from a macro, or overarching, level about how the focus of ethnography, and ethnomethodological analysis should be aligned. This does not explain, on a micro level, the necessary situated actions in doing interaction design; which means the moment-by-moment temporal organisation of activities that constitute the tasks for design.

Research articles (explored in section 1.4.3.2) mention that design choices were created from the use of ethnographic methods for interaction design, or in other words, design was ‘informed’ through ethnographic research. However, the focus of these articles is not on the description of what constitutes ethnography for interaction design at the micro level.

For example, Brooke and Burrell (2003, p2) state:

“The initial research phase consisted of semi-structured interviews and participant observations. We wanted a view of the entire industry to understand where best to intervene with technology. Over a period of six months, we interviewed people in the wine industry, from grape growers to wine sellers, and supplemented this with participant observations.”

Understandably, the specific step by step methods are not the focus of Brooke and Burrell’s research, but, as a novice researcher, I found it difficult to identify the exact ways in which these methods could be replicated to achieve Gamification design.

The above research article, among others, introduced in the literature review (section 1.4 onwards), gloss over the specific methods of how ethnography for interaction design and, subsequently, ethnography for Gamification design can be accomplished. Therefore, this dissertation unpacks the
often glossed area that is usually represented with an arrow in a diagram (circled in the below diagram) denoting a shift from ethnographic research to design elements.

Figure 1.0 – Glossed Gamification Diagram

This research uses the descriptive nature of ethnomethodological principles to provide a reflexive account of doing ethnography to design the Player Focus section of a Gamification architecture.

Two research questions have been developed from the reviewed literature to focus the investigation:

1. How are Player Focus Gamification architecture elements derived from telephone data?
2. How are additional Player Focus Gamification architecture elements derived from in-home data?

This dissertation found that the glossed area denoted by the arrows between the boxes in a diagrammatic representation of the user-centered design process can be made up of a series of smaller interaction based design elements. These elements are interaction-centered, meaning they are a product of the interaction between the designer, the participant, and the context.

Research Question One found that the structural way in which people answer questions over the telephone can change the sort of findings in the data. Meaning, that people’s own actions, shown in the way they attend to questions, reveal various interactional phenomena which can be used as a base for design decisions.

Research Question Two found the ability of the designer to be face-to-face with the participants and to add visual information to the interactive design process changes the ability for designers to ask questions and uncover additional data.

The contribution this research provides to the Gamification design community is firstly by demonstrating the place that interaction has in the design process. This research found that the glossed areas, or arrows, in the design process are actually made up of interaction-based activities between designers and users.

Second, the research explicated the process of incorporating ethnographic methods into Gamification design work. Ethnography in interaction design is not a new area as the reviewed literature demonstrates. Also, the specific design tools of personas, scenarios, and stages of mastery (described in section 1.4.3.2) are not new areas of research. The contribution of this research lies in
the description of the accountable actions demonstrated to achieve these design tools and their transition into a Player Focus section of the Gamification architecture.

The following section will introduce the various literature topics that were explored throughout this research. This literature review encompasses the elements which were required in order to undertake the task of Gamification design. I see this as a combination of a literature review and an academically annotated journey of, in ethnomethodological terms, ‘doing Gamification design research’.

1.1 Behaviour Modification for Energy Conservation

This section briefly introduces behaviour modification research for the purpose of energy conservation. First, it provides a brief introduction to situate the reader. Second it introduces specific behaviour interventions that research has focused on. Finally, it introduces the use of technological interventions as a medium to deliver these interventions.

Since the 1973-1974 Arab Oil Embargo, a significant portion of energy efficiency research has been focused on intervention based behaviour modification techniques. The energy conservation interventions undertaken by behavioural researchers have been classified into pre and post action behaviours. The standardised categories adopted to group these interventions into are “antecedent” (pre behaviour ) and “consequence” (post behaviour) (Abrahamse et al., 2005; Darby, 2010; Dwyer et al., 1993; Ehrhardt-Martinez et al., 2010; Wood & Newborough, 2003).

1.1.1 Behaviour Interventions

Antecedent interventions aim to influence one or more underlying determinants prior to the performance of behaviour. These include commitment, goal setting, modelling, and information provision. A commitment is defined by Abrahamse et al. as either an oral or written pledge or promise to conserve energy. The commitment can be made either internally to oneself or externally to others. Goal setting involves giving households a point of reference to aim their use toward. Goal setting and commitment generally go together; for a goal to be achieved, one must commit to undertaking the goal. Modelling is based on Bandura’s (1977) Social Learning Theory which posits that people learn through social context by copying and modelling other people’s behaviour. Information provision involves providing general or tailored facts about domestic energy to encourage conservation.

Consequence interventions according to Abrahamse et al. (2005) are based on the premise that consequences, either negative or positive, will influence behaviours. These interventions are feedback and rewards. A review of 98 feedback studies by Darby (2000) classifies feedback in one
of three categories; direct feedback, indirect feedback, (e.g. electricity bills) and inadvertent feedback (e.g. new equipment). Direct feedback involves providing the household with feedback close to the time of energy use. This is mainly achieved through the use of an in-home device (IHD) which provides a visual representation of the instantaneous energy use. Indirect feedback involves raw energy data being processed by the energy company and being sent to the customers. This usually is attached to the monthly or three-monthly invoice from the energy company. New electrical equipment or installation of a solar system can act as vehicles for inadvertent feedback with an increase in interest present due to the new equipment causing the household to seek feedback. Rewards have been examined as an extrinsic motivator to conserve energy. Early research by McClelland and Cook (1980) concluded that monetary rewards play a very strong incentive for consumers to reduce domestic energy use.

1.1.2 Technology as a Medium

More recently, persuasive technologies are being developed to help change people’s energy behaviours. Persuasive technology is defined as “any interactive computing system designed to change people’s attitudes or behaviours” (Fogg, 2002, p. 1). These technologies, dubbed In-Home Devices (IHDs), are operationalizing the antecedent and consequence interventions from prior research in an interactive manner. IHD’s satisfy Abrahamse et al.’s (2005) recommendation of combining at least one antecedent and consequence based intervention for greatest effect. They also match Fischer’s (2008) conclusion that feedback must be given frequently, over an extended period, and should allow users to understand the consequences of their actions (e.g. turning the air-conditioning on). Using persuasive technologies to deliver the antecedent and consequence interventions to domestic energy users is proving to be effective with reports that the implementation of persuasive technologies produces a saving of between 9.2-12% in energy use compared to a 3.8% - 8.4% savings reported in households that do not have this direct technology present (Ehrhardt-Martinez et al., 2010).

The next section will explore Gamification in greater depth and introduce the necessary Gamification concepts for the purpose of this research.

1.2 Gamification

This section gives a brief introduction to Gamification and game thinking in order to situate Gamification amongst other game-based platforms. First, the concept of Gamification is introduced, defined, and unpacked to provide a research based definition. Second, Gamification is situated amongst other game-like activities in order to illustrate its difference from simply playing games.
Third, two examples of gamified systems are introduced to familiarise the reader with working gamified systems to help demonstrate Gamification concepts.

**DS1.2.1 Defining Gamification**

The most frequently quoted definition of Gamification is “the concept of applying the use of game design elements in non-game contexts” (Deterding et al., 2011, p. 10). According to Deterding et al. the use of persuasive technology has seen the integration of video games and also video game aspects to attempt to shape user behaviour. This leverages the addictive nature of video games, the reason why someone can sit for extended periods of time and concentration and play to reach ‘the next level’. Leveraging these addictive elements, similar to the energy conservation research introduced in section 1.1 has had some success in changing behaviours thus far (the below examples illustrate this). The practice of leveraging addictive elements to change behaviours is only emerging as a relatively new research area under the umbrella term Gamification.

**1.2.2 Situating Gamification**

Many people come into contact with Gamification on a daily basis and do not even realise it. For example, buy nine coffees and get the tenth one free is a basic gamified reward mechanism to encourage loyalty. The goal of Gamification is to turn seemingly routine tasks into fun and/or engaging practices by leveraging the motivating factors of games. In order to fully situate Gamification, a brief introduction to four related game-like activities is necessary. These activities are games, serious games, playful design, and Gamification.

**1.2.2.1 Games**

Games are designed with the purpose of entertainment (Magerkurth et al., 2005). They are entertainment devices which include game thinking, game elements and gameplay for the purpose of fun. Examples of games are *Super Mario Brothers, World of Warcraft, and Eve Online.*

**1.2.2.2 Serious Games**

Serious games, according to Michael and Chen (2005) are designed in such a way that education is the primary goal, rather than entertainment and fun. Serious games involve gameplay as a rhetorical mechanism to encourage change in the user. Serious games are designed to incorporate all of the elements of a game: game thinking, game elements, and gameplay. However, the design is not for fun, it is for a specific purpose.

**1.2.2.3 Playful Design**

Playfulness in user experience is defined as elements of a design that engages people’s attention or involves them in an activity for play, amusement, or creative enjoyment (Kuts, 2009). Therefore,
playful design is the concept of designing to engage people’s attention in a playful manner. Playful design does not involve any gameplay and is designed for the purpose of fun. An example of this is the Twitter Fail Whale. The Fail Whale is a playful design by Twitter which uses the game design concepts of aesthetics and usability to present a fun image to illustrate when their servers are at user capacity. Rather than a simple error message, they have made this error message fun and aesthetic.

1.2.2.4 Gamification

Gamification, by definition, is not a game. Gamification uses game design elements in a non-game context (Deterding et al., 2011). Gamification exists to influence users to continue participation with a system. The elements and mechanics of Gamification are designed into feedback loops which engage and motivate the user to interact with the system. Gamification is similar to serious games in that it is designed for a purpose. However, the one difference between serious games and Gamification is that Gamification does not need to involve any gameplay.

The below table represents the four game-like activities and where they are situated in relation to game thinking and design goals:

To better understand Gamification, I will illustrate two popular examples below. These two examples of Gamification show how the elements and mechanics of games and gameful design are used in a non-game context with a specific purpose that is not classified as fun.
1.2.3 Examples of Gamification

1.2.3.1 FourSquare

FourSquare is a location based smartphone service that provides rewards and points for users who ‘check in’ to locations (Xu, 2011). Foursquare is currently the most popular application of game mechanics to location based activities. Foursquare uses points, levels, leaderboards, and badges within its system to encourage users to visit and re-visit locations for the purpose of customer loyalty. The win condition of Foursquare is when someone becomes “Mayor” of an establishment by checking-in at it more than anyone else. The establishment may choose to reward the Mayor; for example, Van Grove (2010) reported that Starbucks previously offered Mayors a discount on their coffee purchases.

1.2.3.2 Nike Plus

Nike Plus is a service that encourages users to compete against each other to improve their fitness (Xu, 2011). The goal of the system is to solve one of the hardest problems in the exercise industry – motivation. The idea behind Nike Plus is that the motivation to compete against other people in a competition is stronger than the intrinsic motivation of losing weight for its inherent reward. Nike Plus has a web portal that allows users to upload their data and challenge themselves (based on historic data) or friends in their social network.

The fundamental building block of a gamified system will be explored in the next section; the Gamification Architecture. The architecture is the document that details design choices such that a coder can take the document and build an initial revision of the intended system.

1.3 Designing a Gamification Architecture

The above section introduced the concept of Gamification, situated it amongst other game-like activities, and provided some real-life Gamification examples. This section addresses the concept of creating a gamified system by first introducing a common design element called a Gamification Architecture. Second it discusses the organisation of the architecture from its standard industry focus into a workable and designable document. Third, this reorganised document is presented and each section is described in detail.

Even though this dissertation addresses the specific section of the Gamification architecture called the Player Focus, which address the intended players, understanding the architecture in its entirety and where this research fits into the document is important in progressing future research. Therefore the Player Focus section is introduced first and discussed in greater depth than the other sections of the architecture, which provide background information.
1.3.1 What is a Gamification Architecture

The Gamification architecture acts as a system blueprint. The purpose of the architecture is to design the necessary activity loops by incorporating the relevant mechanics in a framework focused way to target system objectives. This dissertation is based on prior work by Gamification Industry leader Gabe Zichermann. Zichermann who is positioned as the industry leader through his running of the major Gamification conference gSUMMIT\(^1\). Zichermann has published several books on Gamification and is recognised as the industry thought leader on this topic. He also runs the industry recognised predominant Gamification certification course\(^2\). This research uses Zichermann’s industry standard architecture guide, used in his Gamification certification courses, as a starting point in Gamification design.

The template represents the fundamental elements, mechanics, and dynamics of what needs to be addressed in a Gamification architecture. The original template can be seen in Appendix A. It is important to note that this template assembles the fundamental elements, mechanics, and dynamics that may be employed in a gamified system. Not all of the elements of the architecture need to be used, and conversely, every possible mechanic is not listed on this document. However, it provides areas for thought and design and a focus for how to implement the framework suggestions in a gamified way.

1.3.2 Organising the Architecture

The architecture template provided by Zichermann, as it sits, is quite unstructured. The content of what needs to be included in an architecture is there, but there is little organisation of the concepts. The template is just a list of concepts to address. Therefore, I have arranged the concepts into relevant categories that I believe best represent their intended focus. The categories have been labelled Player Focus, System Focus, and Activity Focus. Since this research is concerned with the role that ethnography plays in contributing to a Gamification architecture the Player Focus section will be examined in greater depth than the System Focus and Activity focus sections.

1.3.3 The Gamification Architecture

1.3.3.1 Player Focus

The player focus comprises the elements of the architecture that are focused on the users of the system. These elements are player types, player stories, and stages of mastery.


\(^2\) [http://Gamificationu.com/](http://Gamificationu.com/)
Player Types

Player types are used to understand what different people want out of a game. As Zichermann and Cunningham (2013, P21) argue “The more you know about who is playing your game, the easier it is to design an experience that will drive their behaviour in the desired way”. This stems from user characteristics which aim to capture the key attributes of the intended user group (Sharp et al. 2007). Player types are more refined than that of user characteristics insofar as they are focused on the specific context of a game and Gamification design. Player types are used to structure the design of the system and build a desirable experience for the users.

The most common rubric for categorising players in Gamification is Bartle’s (1996) research into (massively multiplayer online games) MMOG (Zichermann and Cunningham, 2013; Duggan and Shoup, 2013). Bartle identified four different player types; Achiever, Explorer, Socialiser, and Killer. According to Bartle’s taxonomy, achievers set game-based goals and spend the majority of their time focused on achieving those goals. Explorer’s game interests are driven by the desire to explore the topological landscape and the intricacies of game mechanics. Socialisers prefer to play the game with a focus on social interaction. The game is almost used as a communication platform to interact with others players. Killers thrive on competition with other players and prefer to compete with other players rather than computer controlled players. These player types can be seen situated in the below image:

![Bartles Player Types (1996)](image)

Figure 1.3 – Bartle’s Player Types
Gamification is primarily a player focused method of interaction. Its underlying philosophy is traditionally a marketing based customer first style of thinking. Much emphasis is placed on player types and designing for specific types to maximise engagement. It is this player focus that has seen Bartle’s research adopted as the go-to player focused methodology. This taxonomy of user types is not the only way of understanding the users of a system. Bartle (2012) himself argues, his theory explains why people play MMOGS for fun. His taxonomy does not explain why people play non-MMOGS, or people that do not play for fun, or people that do not play games at all. Bartle argues that when Gamification practitioners use this taxonomy out of the context of MMOGS they take a gamble that it may or may not work where there is no reason it should.

Bartle’s system of assigning players into a pre-determined category may work well to accurately categorise some participants. However, there will nearly always be instances of people who do not fit in any of these categories. Providing a limited number of categories for people to be assigned, will find the unsurprising result that everyone fits, or is forced, into one of those four categories. This is fundamentally opposite to the ethnographic approach of letting people’s actions present relative categories. A proven method of understanding and designing for specific player types is through the use of personas. Personas, as further unpacked in section 1.4.3.2, are rich descriptions of typical users of the product under development that the designers can focus on and design for (Sharp et al., 2007). These descriptions are generated from contextual information about real users (Hartson and Pyla, 2012) which is derived from ethnographic research. As argued by Dixon (2011) player types are (at this stage) not a defined concept. Dixon argues that personas are a useful tool to put the ethnographic research into practice as part of a gamified system. However, there is no published peer reviewed research on the use of personas for the design of a Gamification system; this gap in the literature is addressed in this thesis. This thesis proposes that the use of personas in place of player types offer a rich ethnographic backing of contextual information to inform the design of a gamified system.

Player Stories

Player stories are touted as one of the most important areas of Gamification, however very little literature exists on what it actually encompasses. The idea of player stories according to Zichermann and Cunningham (2011) is they allow for the system to be framed in relation to its users and system objectives. As Zichermann (2012) argues, the story arc of a gamified system is based on the journey of the player in real life. The idea of stories to base the player journey on is remarkably similar to the notion of scenarios introduced in the upcoming section 1.4.3.2. At this stage in Gamification research, there appears to be no noticeable difference between player stories
and the user-centred design concept of scenarios. Therefore the established method of scenarios will be used in this thesis to operationalise the concept of player stories in a Gamification architecture.

**Stages of Mastery**

The stages of mastery are important for conceptualising the intended user’s journey through the system. These stages represent virtual stepping stones that demonstrate the user’s understanding of the system itself by their ability to engage with the relative mechanics and elements.

Zichermann and Cunningham identify five stages of mastery:

1. **Novice** - Knows nothing about system
2. **Problem Solver** - Knows how to get answers about system
3. **Expert** - Has a body of knowledge
4. **Master** - Has system as part of their identity
5. **Visionary** - Unusual - Thinks like the creator/owner

These stages of mastery represent intended or desired user engagement and understanding at specific stages throughout the user journey. There is no definitive way to know precisely what behaviours users will demonstrate at specific stages. These stages can be synthesised through a combination of ethnographic research and the inclusion of personas\(^3\). However, the only way to empirically validate these levels is to observe many users interacting with a system through a longitudinal study.

The next section unpacks the concept of focusing on the player and how that is achieved. The section discusses gathering player information to inform the design of the Player Focus section of the Gamification architecture.

**1.4 Focusing on the Player**

This section addresses the design related elements of the Player Focus section of the Gamification architecture introduced in the previous section. The section begins by first addressing why should Gamification focus on the player. Second, it examines how that Player focus can be achieved and the specific methods used to gather data and the guiding principles for analysis. Third, this section addresses how these methods and analysis can inform Gamification design by introducing specific design techniques intended to operationalise the player data.

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\(^3\) This method is used in the findings chapter (section 3.3) to develop stages of mastery
1.4.1 Why Focus on the Player
Understanding the intended players is an important part in the Gamification process. So much so, that, as the previous section demonstrates, one third of the Gamification architecture is reserved to address the player focus. This is argued by Zichermann and Cunningham (2011 p15) who state at the outset of their section on understanding the user that “The player is at the root of Gamification”. Also, this is reinforced by Dougan and Shoup (2013 p23) who posit that “understanding player motivation is key to designing a successful Gamification system”.

The player focus theme in the Gamification literature aligns with the interaction design approach of user-centred design. User-centred design is a simple design concept that places the intended user at the centre of design decisions (Sharp et al., 2007). Simply put, rather than designing a system which focuses on what the system can do and how ‘cool’ it can be; User-centred design focuses on the real users and their goals.

Ethnographic methods are commonly used as a framework for gathering player/user information to form an understanding of the intended users of a system. The following section will introduce the literature on gathering player/user information for the purpose of design work.

1.4.2 How to Gather Player Information
Seeking an understanding of users, their goals, and the complex nature of domestic social contexts has, according to Dourish (2007), prompted designers and researchers to shift towards the social sciences when designing technologies. This shift assists researchers and practitioners in gathering a deeper understanding of not only what potential users say but, at a structural level, how they interact in a specific context. This provides a rich understanding which can provide a thick description of the social context in which technologies and users are co-embedded.

1.4.2.1 Ethnographic Methods
Ethnographic research methods are used in many areas of Human Computer Interaction (HCI) and Computer Supported Cooperative Work (CSCW) research including interaction research, gathering user requirements, developing user models, and new product development and iterative design (Millen, 2000). These areas are representative of a user-centred approach (Sharp et al., 2007) which focuses on the end users and their goals, rather than just having the technological capabilities drive the design choices. This practise of using ethnography for design purposes, or ‘design ethnography’ has emerged as a modern research discipline.

Design ethnography is often referred to as either “rapid ethnography” (Millen, 2000, p. 280) or “quick and dirty ethnography” (Hughes et al., 1995, p6; Crabtree et al., 2012, p.196). Design
ethnography is more focused on gathering relevant information to provide an understanding of the context and ecology of a specific environment (Nardi and O’day, 1999) for the purpose of informing the design of systems for HCI and CSCW. This is achieved by undertaking short focused studies designed to overcome various time constraints due to short product cycles, rapid prototyping, and usability testing (Millen, 2000). Designers use the knowledge of these studies to gain a general picture of the intended setting for which the system is being designed (Hughes et al., 1995; Millen, 2000).

Design ethnography is attracting increasing attention in business, with commercial design teams operationalising these ethnographic methods by conducting fieldwork in kitchens, factories, and print shops (Jordan and Yamauchi, 2008); air traffic control centres (Suchman, 1993); and vineyards (Brooke and Burrell, 2003). These workplace studies are using ethnographic methods to look for relevant broad information to inform design of new technology based systems to improve work output. This increased business attention is seeing design ethnography shift from simply being a research focus to a useable operationalisation of empirical observations.

1.4.2.2 Ethnomethodological Principles

Ethnomethodology (EM) is an analytic approach which is concerned with the study of the methods people use for producing recognisable in situ social orders (Garfinkel and Rawls, 2002). Ethnomethodology describes the routines and actions (which Garfinkel, (1967, p. 1) labels “accounts”) that members use to construct their everyday activities. EM’s Programme uncovers and describes accounts that make an activity recognisably so. This focus is not limited to the participants studied, but historically, EM also analysed the methods of sociology itself. This methodological focus of how the practise of sociology was achieved looked at what it was for a social scientist to establish a ‘scientifically correct’ verdict (Heritage, 1984). That is, what methods do social scientists use themselves to achieve a state in which they can make a claim? Similar to this methodological focus, this dissertation addresses the focus of what a novice designer does to make a claim that the activity of doing ethnography to inform the Player Focus of a Gamification design architecture is being achieved.

EM reworks traditional sociology by dispensing with pre-determined methods, assumptions, and theories. Instead, Ethnomethodology uses the member’s perspective and use of knowledge (Garfinkel and Rawls, 2002) to achieve an understanding of a social setting. Ethnomethodology treats ordinary people as “practical sociologists” (Crabtree et al., 2012 p 184) who make sense of activities through moment-by-moment organised activities. Essentially, it does not matter who the people are, or what they are trying to achieve, the methodical way in which they undertake the
activity is Ethnomethodology’s focus. This focus is used in this research to problematise the taken-for-granted social order of doing Gamification design.

The EM approach to analysing ethnographic data has become popular in interaction design research (Dourish and Button, 1998; Ikeya et al., 2002; Crabtree et al., 2012). Design ethnography literature proposes that Ethnomethodology is used for design by describing the methodical break-down of activities to determine the best way technology can support these activities (Dourish and Button, 1998; Ikeya et al., 2002; Crabtree et al., 2012). However, what this literature does not address is the specific way in which to do so; an Ethnomethodological issue in and of itself. For example, according to Dourish and Button (1998) Ethnomethodology is primarily used as a tool to inform design through:

1. Fieldwork investigations that develop an understanding of work and organizations from the "inside," providing innovative insights into the organizational situatedness of work and the methods and practices through which work activities and interactions are assembled and that may be used in the design of technology to support work.

2. The development of an understanding of the temporal organization of activities and interactions, revealing them to be a moment-by-moment organization and, in so doing, furnishing new concepts around which to generally consider the design of technology.

Similarly Ikeya et al, (2002) argue:

At the theoretical level, ethnomethodologists suggest computer scientists should put down their explanatory tools such as information processing accounts and notions of mental models. Doing so, they should start to look for detailed descriptions of people’s activities to understand where computers and technology may be put into best usage. At the practical level of engineering, ethnomethodologists suggest that their detailed descriptions of people’s activities in settings can help inform developers which activities may be usefully supported by technology and in what kind of way. (p. 5)

Also, Crabtree (2012) states:

You might reflect upon the significance that ethnographic findings have for design to elaborate what is important about the work of a setting, particularly what aspects of it cannot be dispensed with and are critical to maintain and factor into design. Such matters may actively be factored into the development of computing systems through a range of design practices, including software requirements specification (Sommerville 2011), use case
modelling (Jacobson et al. 1992), scenario-based design (Carroll 1995), and the construction of mock ups and prototypes (Greenbaum and Kyng 1991). Each of these in their way enables the specification of work activities and, to varying degrees, their sequential ordering. (p. 195)

The academic consensus is that ethnomethodological analysis can uncover the everyday practices that make an activity recognisably so. These activities can then be used to base design decisions which will help streamline each activity, thus improving the performance of the desired task. However, the specific way in which the designers should actually operationalise the methods into design specifications is not detailed. That is, how does an individual account become a design specification?

The methods that people undertake to construct social order, or to achieve the task that the methods are both part of and recognisable of, are omnipresent and not always obvious to the people themselves. This was demonstrated by Suchman in her ethnomethodological research focused on expert help system for photocopiers. Suchman’s analysis of the problems encountered when using an expert help system on a photocopier demonstrated the benefit of ethnomethodological analysis in the design discipline. Suchman concluded that people respond to specific circumstances and settings, thereby making sense of those circumstances through moment-by-moment activities; dubbed Situated Action. Suchman’s work was the foundation for use of ethnomethodology in HCI design. Using a rich ethnomethodological description of people’s methods in settings helps focus ethnographic research to better inform HCI design and allows understanding of where new technologies may fit in with daily life.

Ethnomethodology in design is as much about doing interaction design as it is about informing interaction design. Which is why it is an appropriate analytical approach to look at the overarching focus of this research: to analyse how ethnographic methods inform the design of a gamified system for domestic energy conservation.

1.4.3 Informing Gamification with Ethnography

Refocusing this issue of ethnographic data to a Gamification sense would see it best positioned to directly benefit the Player Focus section of the architecture. I use the term ‘directly’ as I view the construction of personas as an area that uses direct input from the ethnographic data. The System Focus (section E.1) and Activity Focus (section E.2) sections are derived from a combination of personas, creativity, and industry research. Therefore, in the following analysis (section 3 and 4), this research will concern the Player Focus section of the Gamification architecture as it is directly relevant to the data gathered.
As previously mentioned (section 1.3.3.1) the Player Types section of the architecture is closely related to the concept of persons (further unpacked in section 1.4.3.2), as both intend to provide an archetype of users based on real data. The main difference is the deductive vs inductive approach to this section. The use of Bartle’s player types is a deductive approach whereas the synthesis of a persona is an inductive method. Traditionally, ethnographic research is inductive; therefore I believe that undertaking ethnographic research for Gamification would best be suited to the inductive approach of personas.

The Player Stories and Stages of Mastery are closely related to the concept of scenarios (introduced in section 1.4.3.2). The use of a scenario to understand how a persona will interact with the system is identical to the use of a persona to denote progression through a gamified system and the stages of mastery. At this stage, there is difficulty in clarifying the intertwined difference between the Player Stories and Stages of Mastery sections of the Player Focus. Therefore, for the purpose of this research, these sections will overlap using the persona as a guide to inform their information.

**1.4.3.1 Creating an Ethnographic Record**

There are numerous tools and resources that can be used to assemble an ethnographic record in order to elaborate the ‘work’ of a social setting. Crabtree (2012) proposes that it is dependent on what is being studied. Two common ethnographic methods for gathering data to inform design are interviews and direct observation (Brooke and Burrell, 2003; Sharp et al. 2007; Lazer et al. 2009). Quite often these methods are used in conjunction with a framework which assists in structuring the data gathering process. However, as Brooke and Burrell note, the researchers are free to digress from the guides if interesting points arise during the investigation.

Interviews can be conducted either via telephone or face-to-face. Some advantages of telephone interviews are that a large number of people are reachable via telephone, which means many people can be interviewed in a short timeframe (Neuman, 2006). Telephone calls can be recorded which allows for data to be transcribed for future analysis. Telephone interviews can be scaled up or down with relative ease and minimal cost. The main disadvantage to telephone interviews is the ability to obtain visual data is not present (Sharp et al., 2007).

Face-to-face interviews allow for the visual element to be addressed with the researcher being present with the participant. They allow the interviewer to also observe non-verbal cues from the participant and use visual aids (Neuman, 2006). The main disadvantage of face-to-face interviews is the high cost of both time and resources.
Research by Sturges and Hanrahan (2004) implies there is a trade-off when it comes to gathering ethnographic data via telephone and face-to-face. Their research suggests that at one end telephone interviews require less cost, easier access, and interviewer safety. However telephone interviews miss out on some of the richness that face-to-face interviewing can bequeath by providing a visual element that can only be obtained by the researcher being present with the participant. However, face-to-face interviews require more work, therefore reaching large numbers of participants require greater resources, and, from a business perspective, cannot be scaled up easily.

These methods of data collection raise an interaction design issue for start-up companies. Most start-up companies simply will not have the resources available to conduct large scale face-to-face ethnographic research. However, almost all businesses will have access to a telephone and can obtain a list of participants to contact. Undertaking a start-up endeavour to design a gamified system for energy conservation brought this methodological issue to my attention. This led me to explore the comparison of two common ethnographic methods for the purpose of informing Gamification design. Observation methods are used to gather in-situ data from participants in the field. Structured ethnographic frameworks have been found to help focus observations in the field (Sharp et al., 2007). According to Sharp et al. the framework can be as simple as:

- The Person - who is using the technology
- The Place - where are they using it,
- The Thing - what are they doing with it

More complex frameworks exist, such as Spradley’s (1980) framework which has nine elements, comprising:

1. SPACE – physical layout; rooms, outdoor spaces, etc.
2. ACTORS - the names and relevant details of the people involved
3. ACTIVITIES – what the actors are doing and why
4. OBJECTS - physical elements: furniture etc.
5. ACTS - specific individual actions
6. EVENTS – are observations part of a specific event, e.g. meetings
7. TIME - the sequence of events
8. GOALS - what actors are trying to accomplish
9. FEELINGS – group and individual moods

However, what is not explained clearly in the literature is how these frameworks can be used to describe the ‘work’ of a setting. Moreover, what else is missing is how to take observations and
develop system specifications with the empirical data. There is no specific framework that encompasses every possible observable occurrence for design ethnography. Each design project will be vastly different to the previous and with that difference will be different elements to observe and record. Therefore, the experience of the researcher is needed to understand which elements of a framework are necessary to use for specific settings. A good researcher will tailor a framework to each specific design project in order to maximise the ability to capture relevant information required for the system design.

From an ethnomethodological perspective, with frameworks come the pre-defined assumptions to only look at observations through the lens of the framework. This is largely opposite to ethnomethodology’s programme which is focused on members’ methods. However, some structure does need to be present in order to frame observations, or the result may be many hours of unstructured and non-contextual video recorded data.

1.4.3.2 Representing the Player

The previous section presented literature on the role Ethnography plays in gathering player information and the analytic perspective of Ethnomethodology. The section also introduced two common methods used to gather data for analysis. This section will look at how data gathered via these methods, and analysed from an ethnomethodological lens can be operationalised into representing the player for design purposes.

The use of an ethnographic record which Crabtree et al. (2012, p191) describe as “a corpus of data that elaborates the work of a setting and the methods that members use to conduct and organise it” can be used as a proxy for ‘vulgar competence’ or in other words an ordinary understanding of the setting. Developing this record using various methods, such as audio-visual recordings, photographs, transcripts, and diagrams (Crabtree et al., 2012), will provide information from a researcher’s perspective. However, if the design is intended to be focused around the users’ perspective in a particular setting, then developing the record from the members’ view is a more obvious choice.

The ethnographic record can inform design in several different ways, for example, it can be used to guide the development of an entire system (Brooke and Burrell, 2003), describe how users make sense of complex tasks in existing systems (Suchman, 2006), and understand social contexts in which users and technology are embedded (Dourish, 2007). However, these ways of informing design are presented as labels which are difficult to elaborate on or interpret. To better understand this issue Brooke and Burrell’s research will be used as an example: Their research consists of semi-structured interviews and participant observation to assemble a view of the entire industry in
order to understand where best to intervene with technology. They argue their work has developed
design concepts which constitute the practise of design ethnography. They then state that these
concepts were developed toward working systems with some only going as far as sketches, others to
the point of interactive demos and some into a working computer infrastructure. The aspect of this
research that remains unexplored is the process by which the ethnographic data they uncovered was
transformed into concepts and then into working systems. This is not intended as a criticism of this
or other work as there are numerous reasons this area remains unexplored, for example, time
constraints, or it was not the researchers’ primary focus. For whatever reason, from a novice
perspective, I find that this is a gap that my research contributes to by helping describe the process.
One way in which the ethnographic understanding may be operationalised for design is through the
User-Centred Design approach of personas and scenarios.

Personas and Scenarios

Personas, as introduced in section 1.3.3.1, are rich descriptions of typical users of the product under
development that the designers can focus on and design for (Sharp et al., 2007). These descriptions
are generated from contextual information about real users (Hartson and Pyla, 2012) which is
derived from ethnographic research. Personas generally have a name, demographic information, and
personal details to give it a real person feeling. Personas are goal orientated to help designers
understand how the person will use the system with specific relevant goals in mind. Personas are
intended to focus the design team so they don’t try and design the system for themselves or for an
imaginary “flexible user” (Cooper, 2004). Personas are mainly used in the user-centred design
approach which grounds the design process in the information gathered about the end users of the
system.

There are gaps in the literature concerning ethnographic input of personas and scenarios. These
gaps are concerned with operationalising concepts from the data in order to ground persona and
scenarios. The main gap this research is concerned with is in the methodological area of persona,
scenario, and stages of mastery creation. There is no definitive line in the literature that describes
where ethnographic input stops and creativity (conjecture) takes over when developing personas
and scenarios. Some literature touches briefly on how personas and scenarios were created (Pruitt
and Grudin, 2003; Faily and Flechais, 2011), however, as this section demonstrates, there is a lack
of description of specific detail as to how aspects of these elements link to the ethnographic data.

There is no correct method for designing a persona. They can comprise simple demographic
information with needs and goals to focus the design team:
Whereas other personas can be intricate and contain vast amounts of information to give a rich archetype user description:

From an ethnographic perspective, personas could be used to bring Geertz’s (1973) anthropologic notion of ‘thick descriptions’ into the design sphere. The idea of thick description is that the behaviour is explained and recorded within a specific context, which in turn makes it meaningful to an outsider to understand the specific behaviours. This notion of thick description is popular in design work as it captures, what Dourish (2007) outlines as the social contexts in which both users and technologies are embedded. The use of personas allows the communication of the relevant ethnographic findings without losing the advantage of thick description.
In the design literature, there is little literature which addresses the design methods of personas. The use of data ‘clusters’ (Jacobs et al., 2008) or ‘concepts’ (Faily and Flechais, 2011) coupled with demographic information appears to be the dominant way of grounding personas in empirical data. However, the explanation of these methods is shallow with little instruction detailing the specific methods used to synthesise the personas. For example two processes for developing personas from Jacobs et al. are as follows:

![Figure 1.4.3 – Persona and Scenario Creation Example 1](image)
Figure 1.4.4 – Persona and Scenario Creation Example 2

These graphical representations illustrate the refined ideal steps in the relative specific development process. However, this begs the question, what does each phase look like? Meaning, what does it look like to create a “hypothetical persona”? What does the “creation of first scenario” comprise? Or, what do the arrows in the diagrams mean? These questions remain unanswered and this work, similarly to Dourish and Button, (1998); Ikeya et al., (2002); Crabtree et al., (2012), is not focused on explicating the methods that make these steps identifiably such. Without these steps I believe it is significantly harder to validate the decisions and choices made in design.

The issue of persona validity is called into question with Chapman and Milham’s (2006) methodological position that it is impossible to verify the accuracy of personas. Their positivist approach is concerned with quantifying the persona data and providing generalisability to the entire population. They argue that as the specificity of a persona increases its population representativeness decreases. From a positivist view, these are all valid concerns; however, personas rely on qualitative data and are generally constructed using an inductive framework. Therefore, attempting to quantify and generalise the personas will not be possible, nor would it be desirable. Also, personas are intended to be specific to remove the concept of designers changing the concept of the user to suit the needs of the moment. This phenomenon is known as “the elastic
“user” (Cooper, 2004, P. 127) “where the elastic user must bend, and stretch and adapts to the needs of the moment”.

Observational studies based around interaction design have concluded that the persona is often dismissed as a design tool when the actual design sessions take place (Blomquist and Arvola, 2002; Matthews et al., 2012). Blomquist and Arvola noted that their participants have trouble conceptualising the personas as a ‘user’ and believe that this may be alleviated if the designers were involved in constructing the personas. Matthews et al. (2012, p. 4) noted that the designers felt being “intimately familiar” with the data allowed them to “bend and stretch” the persona. This “elastic persona” (Cooper, 2004, p. 127) appeared to serve as more of a guideline for design and not a strong focus as it was intended.

Personas are often used in conjunction with scenarios. Scenarios are a fictional story that is used to exemplify aspects of the system design with the persona as the main character. Scenarios are the output of operationalising the persona by imagining it using the system to achieve a goal (Cooper, 2004). The most common scenario in design work is the walkthrough scenario (Pruitt and Adlin, 2010). An example of a scenario is as follows:

Colbi wants to go to a concert with three of her friends. She is online at the G4K site, has her mom’s credit card in hand, and is eager to purchase three tickets with prime seating. The only problem is that she knows that one of her friends is going on an overnight family outing sometime during that same week. Fortunately, Colbi’s group of close friends have shared their G4K buddy calendar with her. Colbi clicks on the Calendar tab and selects her friend from the shared calendar pull-down menu. Her friend’s overnight trip shows up in a different colour on the calendar. Colbi instantly knows she can purchase the tickets for the concert that night.

(Pruitt and Adlin, 2010 p. 381)

This scenario illustrates a case where the technology proposed in the G4K system is used to solve a problem encountered in everyday life. This scenario is one way in which designers can communicate information to the coders building the system. Rather than just stating objective requirements such as a shared calendar and activity colouring; a scenario is used to build context around these requirements which can be used to reflect the context observed in the field during ethnographic observations.
1.5 The Research Issue of Gamification Design
This chapter introduced the literature based concepts which guide the overarching focus of this research; to analyse how ethnographic methods are used to inform the Player Focus section of a Gamification design architecture for domestic energy conservation? From a novice designer’s perspective, this is an area of research that is largely underexplored in the current design and Gamification literature. This is a gap that this dissertation contributes towards addressing by providing a descriptive account of the process through a case study. Since the focus of this research is based on a methodological question of ‘how’ it was argued that EM provides the best conceptual and methodological approach.

1.6 Using an Ethnomethodological Focus
This section will detail the ways in which EM is used in this research in order to clear up any misconceptions. First, an EM approach will be used to analyse the ethnography data for the purpose of design work. This will involve analysing the methods demonstrated by participants to identify how the gamified system will best complement those methods (Dourish and Button, 1998; Ikeya et al., 2002; Crabtree et al., 2012). This is only a small part of the overall research focus which is where the second use of EM comes in by describing the methods of a novice designer doing ethnography to inform the Player Focus of a Gamification design architecture. This is aligned with traditional EM work that sought to analyse the methods of sociologists by turning the resources for achieving sociology into topics of enquiry themselves (Heritage, 1984; Ritzer, 2008).

The primary focus of this research is concerned with explicating accounts of a novice designer doing ethnography to inform the Player Focus of a Gamification design architecture. It just so happens that one area of enquiry is the use of an EM focus to analyse ethnography data.

These accounts, or in other words everyday mundane activities, provide a detailed description of the actions taken to transition between the various elements of ethnography to inform the Player Focus in Gamification design.

1.7 Conclusion
Gamification is a new area which takes elements and mechanics that make games fun and engaging and apply them in non-game contexts. There are current methods used to determine the Player Focus of the Gamification architecture. However, these methods fall short of understanding the richness of both the user and the social context in which the user and system are co-embedded.

At this stage, as the literature review argues, the specific methods undertaken to develop the Player Focus section of a Gamification architecture from ethnographic data is underexplored in a research
capacity. Most of the literature on this topic is based on non-empirical industry research and knowledge. Therefore, there exists a gap to contribute to literature on the role of ethnographic research in Gamification design.

Two research questions have been developed to guide this research. These questions are:

1. How are Player Focus Gamification architecture elements derived from telephone data?
2. How are additional player focused Gamification architecture elements derived from in-home data?

Research question one will look at how ethnographic research over the telephone can be used to inform the design of the Player Focus section of a Gamification architecture. Research question two focuses on gathering additional information to further inform the Player Focus of the architecture from in-home visits. It is concerned with what extra information can be obtained from visiting the home that may not be available via the telephone.
2 - Design and Method

This chapter addresses the methodology used to undertake this research. The level of detail present in this research is designed to expose the methodical activities as the previous chapter argues is underexplored in the reviewed literature. Any research study explains the methods used to undertake the research. Some are quite short and introduce the participants and a quick procedure overview such as Bittle et al. (1979). Whereas, other research provides step-by-step details of how methods contribute to the research setting (Gibson et al., 2011). Since, ethnomethodology is concerned with detailing the methods used to achieve a social context, and doing Gamification design is a social action, explicating the methods in as fine detail as possible is a necessity for this research. Therefore, the methods section serves as an ethno-method in and of itself of myself as a researcher ‘doing ethnography for Gamification design’.

The reasoning for this detail is due to the confusing literature around the methods used to develop a Gamification architecture. For example, Zichermann and Cunningham (2011, p. 21-23) discuss player types and argue that understanding player types is fundamental to designing for change. They present Bartle’s four player types and discuss each one. They then state “It is easy to see how they [player types] can be useful when considering the players of a gamified system”. This is not intended to be a critique against Zichermann and Cunningham’s work, more it is demonstrating, that at this stages, the specific methods of how to use player types, or personas, to consider the players of a gamified system is largely glossed over.

Another methodological issue identified in the Gamification literature is what to do with the player types, or personas, once they are created. That is assuming the first hurdle of creating a representation of the player is overcome, how are design choices arrived at based on archetype abstractions of real users? For example, Duggan and Shoup (2013, p. 25) state “understanding the different types of game players is important, as is applying those specific player types to your customers and employees to drive desired behaviours.” The ‘methods’ presented by Duggan and Shoup are simply statements of how these understandings can be applied. But the actual method of how to apply them is not thoroughly explained. This is likely due to the infancy of Gamification as a research area; which is where this dissertation makes its contribution.

A visual representation of the two methodological shortcomings in Gamification literature can be seen below; the red circles represent the methodological areas this research is addressing:
Therefore, as Ethnomethodology is concerned with fully understanding these methods, it is necessary to fully describe and demonstrate their reflexive nature as being both a necessity to, and a part of, Gamification design.

2.1 Recruitment Criteria

To ensure the participants for this project would provide meaningful information that is focused to the design related topic (Millen, 2000) three criteria were imposed to guide recruiting. Participants were to:

1 - Contribute financially to electricity bills

This was a requisite to ensure that the participants had a general understanding of their electricity use and the consequences of consuming electricity.

2 - Use social media sites such as Facebook more than once a month

This was to ensure that the participants are aware of the internet and social media sites and their general functions.

3 - Play video games on computers/consoles/tablets/smartphones

This was to ensure participants were familiar with some type of game or games.

2.2 Ethics

Prior to commencing the fieldwork, this research was granted ethical approval from the School of Journalism and Communications ethical review body. Full informed consent was given verbally by each participant and was recorded with recording software. There were no issues raised by the participants that would be identified as being of ethical concern.

All images of participants and of participant’s homes and items were printed with permission from the individual participant.

The images used for persona creation were sourced from google images for illustrative purposes and also to help protect the anonymity of the participants from this research. All other images displayed in this work are owned by the author unless otherwise stated.
The pseudonyms created for both the participants and the personas were randomly chosen names to protect anonymity. These names do not reflect any association with participants or any specific people.

2.3 Research Methods

The method used to address the research questions was comprised of two phases: Phase one involved developing elements of an initial Gamification architecture based on ethnographic information gathered via a telephone interview. Phase two involved administering the same interview as phase one, in-person in the participants’ home and also conducting an observational walk-around in the home to gather as much information as possible relating to internet, social media, and video game use (technology use) and home energy use.

The ethnographic component of this research used the common methods (Sharp et al. 2007; Lazer et al., 2009) of interviewing and direct observation for gathering user information to inform interaction design. The two methods are being administered through two separate fieldwork components. For the purpose of clarity the fieldwork components will be named “telephone” and “in-home”.

2.3.1 Interview

The purpose of the interview was to gather relevant user information about technology use and domestic energy use via the telephone. The resulting data was used to identify which elements of a Gamification architecture can be derived from ethnographic interview data.

This field of research is heavily commercialised with many companies offering interaction design services for substantial fees. So finding a standardised set of questions to use in this research proved to be unfeasible. Therefore the questions were derived from the reviewed literature with focus on the key topics of technology use and energy use. These questions were designed to encourage open ended responses from the participants. The idea was to use them as a guide and encourage the participant to tell me as much information as possible about the topics of technology use and energy use. The questions were developed in the focused style of design ethnography (Millen, 2000), with the intent to gain a general understanding of the setting (Hughes et al., 1995).

The same interview questions and guide was used for both the telephone interviews and the in-home interviews. The telephone interviews were recorded with recording software on a mobile telephone to allow transcription. The in-home interviews were recorded with a video camera set up on a tripod, to the side of the interview. An example can be seen in the below image:
2.3.1.1 Interview Questions

The literature review provided the basis for the relevant categories and guided the development of the interview questions. The 44 interview questions were grouped under three relevant categories which were designed to help focus the interview on specific topics.

These categories were:

1. Demographic questions (Questions 1-10)
2. Technology use (Questions 11-21)
3. Home energy use (Questions 22-44)

These categories each consisted of a set of questions tailored to the specific context of eliciting information from the users to construct requirements for a gamified system for domestic energy use. A copy of the interview question guide can be seen in Appendix B. The questions were designed to encourage participants to offer as much information as possible about the topics explored. The use of probes (Robson, 2002) such as silence and the utterance “mhmm” encouraged interviewees to expand on a response. I found these general probes to be beneficial when the participants had more information to contribute. The demographic questions were designed to gather demographic information about the participants in order to design a user persona for the development of the architecture. The technology use questions were designed to gather an understanding about the participant’s internet, social media, and video game use. The home energy use questions were used...
to gather an understanding about how the participants conceptualise, understand, and communicate electricity information.

Demographic Questions
The demographic questions acted as both the main source of demographic information to generate a persona and a warm up tool (Robson, 2002) to put the participant at ease for the rest of the interview. Other than for the purpose of creating some realistic elements of the persona, such as age, employment status, education (section 2.2.1.3), and putting the participant at ease, the demographic questions served no other purpose in this research.

Internet and social media use
Questions 11 to 15 were designed to promote discussion about what technologies people have in their home and domestic internet use. Understanding what technologies are present in the home is important for informing a new Gamification based system. This can help direct the deployment recommendations of the system regarding issues of hardware. Domestic internet use can, in this case, serve as an indication of how active participants are on these technological devices. This may be an indication of how much the person may interact with the gamified system, and to what extent they may explore its features.

Questions 16 to 18 were designed to understand social media and game use. I aimed to gain a general understanding of existing social platforms people use including things like what sites and how often they visit those sites. I also wanted to explore current, if any, games that people play. I grouped these together, as many successfully gamified systems are already present on social media (such as the Zynga\(^4\) suite of games), and touch devices (such as Angry Birds\(^5\) or Draw Something\(^6\)).

Questions 19 to 21 served to explore if people have used any applications or games to help change or track their behaviour. There are various applications that aim to change peoples’ behaviour, for example, Lumosity\(^7\) for cognitive ability, MyFitnessPal\(^8\) for weight loss, and Runtastic\(^9\) for exercise. These are all examples of persuasive technology that people have self-selected to currently use to change behaviour. This is key, because they have taken otherwise mundane tasks, similar to saving energy, and made them fun and engaging.

\(^4\) [http://zynga.com/](http://zynga.com/)
\(^6\) [http://omgpop.com/drawsomething](http://omgpop.com/drawsomething)
\(^7\) [http://www.lumosity.com/](http://www.lumosity.com/)
\(^8\) [http://www.myfitnesspal.com/](http://www.myfitnesspal.com/)
Home energy use

Questions 22 to 24 intended to explore people’s awareness of both their own use, their household use, and if they have any technologies in place to monitor their use. These questions were designed to see if, through these questions, it can be determined if people really know how much energy they use in their own home.

Question 25 served a purpose of understanding definitions. Since kilowatt and kilowatt hour are the two main units used to communicate electricity use to consumers. This question is used to help guide the architecture design regarding the communication of electricity concepts.

Questions 26 and 27 were concerned with methods to communicate energy efficiency already present in people’s homes. The energy rating stickers\(^\text{10}\) present on new home appliances helps to inform the buyer of its environmental impact. I wanted to explore if people still keep them on the device, and if that information had an impact on their purchasing decision. This would help guide the effects and reception of energy efficiency communication, and help inform design of such a system.

Questions 28 to 40 were designed with two purposes in mind. The first is to get an idea of what main energy consuming items are present in the homes of the participants. The second is to act as a cool-off (discussed below) period during the interview by providing easy to answer questions for the participant.

Finally, questions 40 to 44 were designed to encourage participants to think about reducing their energy use, and what activities they might undertake if they chose to do so. Also, the topic of motivation was introduced to gather some qualitative responses about previously researched motivation techniques in this specific context.

Since this was a semi-structured interview, some of the questions were not asked in the specific order, for example, some participants said early on that they had air-conditioning in their home, so asking them again if they have air-conditioning was not necessary as I already had that information. However, to focus the majority of the questions an interview guide was developed and the processes were followed to direct the structure of the interview. The interview guide will now be discussed in more detail.

2.3.1.2 Interview Guide

An interview question guide was developed to structure the interview process (see Appendix B for the guide). This guide was based on the following common interview sequence by Robson (2002):

1. **Introduction** – Interviewer introduces himself, explains the purpose of the interview, assures of confidentiality, and asks permission to tape and/or make notes.

2. **Warm-up** – Easy, non-threatening questions at the beginning to settle down both the interviewer and interviewee.

3. **Main body of interview** – Covering the main purpose of the interview in what the interviewer considers to be logical progression.

4. **Cool-off** – A few straightforward questions at the end to defuse any tension that might have been built up.

5. **Closure** – Thank you and goodbye.

The below table shows how Robson’s process was used to guide the interview process for both the telephone and in-home interviews.

<table>
<thead>
<tr>
<th>Robson’s Sequence</th>
<th>Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>Introduction, Informed Consent, and Interview Start (located on interview script, see Appendix C)</td>
</tr>
<tr>
<td>Warm Up</td>
<td>Demographic questions (1-10)</td>
</tr>
<tr>
<td>Main Body</td>
<td>Questions (11-41)</td>
</tr>
<tr>
<td>Cool off</td>
<td>Questions (42-44)</td>
</tr>
<tr>
<td>Closure</td>
<td>Thanking participant</td>
</tr>
</tbody>
</table>

The interview guide provided a structured approach that allowed the interviews to have clear sections. This allowed a smoother transition between questions and sections and allowed for standardisation between the interviews.

**2.3.1.3 Analysis of Interviews**

An ethnomethodologically focused analysis of the interview data was undertaken. This involved looking past the content of the interview and looking at its structural makeup. This is based around Houtkoop-Steenstra’s (2000) work of analysing interviews using a Conversation Analysis (Ten Have, 2007; Hutchby and Wooffitt, 2008) framework.

A line-by-line analysis of the interview data was undertaken which looked at individual question and answer sequences throughout the interview. These sequences focused on the mutual
understanding that was co-constructed between the interviewer and participant. This understanding allowed the quality and content of the question and answers to be addressed from a methodological viewpoint.

This data is not being analysed as interview data to draw generalizable conclusions from, therefore every possible theme and nuance is not being drawn out of it. At this stage, the relevant broad categories and how those categories are structured in the available data, that is, how (and if) the elements of that category can be used to inform the design of a gamified system is being analysed.

Example Analysis of Demographic Questions
The purpose of the ten demographic questions was to establish demographic information from the participants and also to warm up (Robson, 2002) the participants to answer further questions. Demographic information is present in the design of personas. However, unless the data is being generalised across specific demographics then for the purpose of qualitative personas it is not of significant value. This information acts as a way to bring realism to the persona by providing some demographic information with which to populate the persona and separate it from simply being a list of design goals and user information. The participants treated the demographic questions as a standard request for information (Hutchby and Wooffitt, 2008) with no evidence of misunderstandings encountered. For example:

Transcript 8 Lines 9 - 14

Andrew: do you identify as being aboriginal or Torres Strait islander
Bec: no
Andrew: do you rent or own the home you’re living in
Bec: we own it
Andrew: and how long have you been living in that home
Bec: uhhh three and a half years

The presence of an answer to each question produces an expected response to the initial utterance (question). The use of information from demographic questions is not of importance for this research. Therefore, it is only touched on briefly and not explored in depth.

Example Analysis of Technology and Electricity Use Questions
The purpose of these questions was to obtain an understanding of participants’ internet, social media, and technology understanding and use. Also an in-depth understanding of electricity use was aimed for. Therefore an understanding of the social context in which these the participants, technologies and energy use are co-embedded was the aim of these questions.
Before exploring what Gamification architecture elements could be derived from telephone data it is necessary to ensure the quality of the telephone data. For this purpose I chose to analyse the question and answer sequences and look for instances where a lack of understanding of prior talk (Houtkoop-Steenstra, 2000) was displayed. The successful completion of a question and answer sequence demonstrates that a mutual understanding has been reached by the interviewer and the participant which signifies progression of the interview into the next question. For example:

**Transcript 10 Lines 106-111**

| Turn A | Andrew: | ok do you know how much energy your refrigerator uses |
| Turn B | Lisa:   | no |
| Turn A | Andrew: | alright do you have a second fridge or freezer by any chance |
| Turn B | Lisa:   | no |
| Turn A | Andrew: | and what water temperature do you use to wash your clothes |
| Turn B | Lisa:   | cold |

In the above sequence the turns labelled as Turn A are requests for information produced as interview questions. The turns labelled as Turn B are the responses to the request which are the answers to the questions. These responses are accepted as answers by the beginning of a new question sequence. The sequence A, B, A, B, A, B demonstrates successful progression through the interview with no difficulty encountered or repair initiated. A lack of understanding within a sequence would not offer an answer to the question in turn B, but would however insert an utterance to request clarification. For example:

**Transcript 8 Lines 57-62**

| Turn A | Andrew: | alright and do you use social media, any social media websites |
| Turn A1 | Bec:   | like Facebook |
| Turn A2 | Andrew: | yes |
| Turn B | Bec:   | yep occasionally I’ll log on but not very much |
| Turn A | Andrew: | ok and so you don’t log on very much I take it you don’t play many games on those sites |

This above sequence demonstrates a lack of clarification and focus about what constitutes social media was attended to with a proposed example of what the participant believes constitutes social media. The question in Turn A isn’t directly answered in Turn B. Turns A1 and A2 are inserted into the sequence to make sense of Turn A in order to produce Turn B, and thus move on to a new Turn A.
This method was used to analyse the data and look for any instances where the question was not attended to, or there was difficulty producing an answer. Instances where the question produced a response that was attended to were analysed to determine what element of the question was misunderstood. This found that the presence of misunderstanding was not problematic for design. In fact, instances where understanding was achieved after inserted sequences produced a relevant finding to inform design. This is addressed in the telephone analysis chapter.

The interview portion of the in-home visit lasted approximately the same length as the telephone interviews. The initial setup of recording hardware and software saw some small talk being made, but nothing noteworthy was discussed. Regarding the question structures, there were no identifiable differences in the in-home question and answer sequences then that of the telephone sequences. The in-home questions themselves provided no new findings or data that was not already present in the telephone data.

2.3.2 Direct Observation

The observation component was the second part of the in-home phase of this research. This component was modelled after standard user observation methods (Sharp et al., 2007). The idea of the direct observation was to gather as much information as possible relating to technology use and home energy use. The idea was to view as many relevant11 rooms as possible in the home and take detailed notes, coupled with still photographs of the rooms (if permitted), and audio recording of the walk around.

As discussed in the literature review, there are many different frameworks which allow the researcher to structure their observation data. Spradley’s (1980) framework (refer to section 1.4.3.1) was decided as the framework to use for this research. There are two main reasons for choosing this framework for this research: Firstly, Spradley’s framework is a common framework in interaction design (Sharp et al., 2007). Secondly, the framework is simple to implement and it allows a comprehensive amount of structured information to be recorded.

The framework was relatively easy to use insofar as it was able to be implemented quickly with a combination of notes, audio, and visual recording devices which captured information relating to the context of the activity. Also many of the framework elements were captured with the recording devices alone, which allowed for more time to be focused with the participants. Since recording devices captured the information in real-time, compared to lengthy note-taking processes, it minimised the invasiveness and disruption that prolonged research encounters have on the participants’ social lives according to Bengry-Howell & Griffin (2012).

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11 Relevant rooms denote rooms where there is a presence of technology or electricity use.
The framework offered a comprehensive view for recording data as it allows many elements to be teased out separately. Rather than just using a basic framework such as The Person, The Place, The Thing (Sharp et al., 2007, p. 324) this framework was used to avoid glossing over phenomena by limiting them to only three categories. Since the purpose of this research was to understand the difference between telephone and in-home methods, having a comprehensive framework allows rich ethnographic data to be collected for comparison as opposed to a shallow framework that does not provide in-depth knowledge.

A basic energy use and technology use inventory (see Appendix D) was developed to guide the observation which allowed a standardised frame of reference for each participant’s house. The idea of this inventory is to encourage the participant to walk around their house in a show and tell fashion. This walk around was designed to encourage participants to discuss any further thoughts about their electricity use that may not have been apparent during the interview.

2.3.2.1 Analysis of Observations
The initial analysis of observations was concerned with identifying any observable data that could not be gathered over the telephone. The analysis used Spradley’s framework to organise the observed data and identify instances of observations that could only be made in-home.

The descriptive question matrix (Spradley, 1980, p. 82-83) was used to focus on how the elements relate to each other. Understanding the elements on their own is important; however, social situations are often made up of more than just one element, so understanding how they relate to each other in this context is important to developing the analysis further.

Example Analysis
An example of how the analysis was undertaken is as follows. This example is concerned with how the use of space and objects contributes to the interview:

Rob is a single male who lives in a one bedroom unit. Rob works full-time and coaches and referees local sport several nights a week until late – circa 10pm. Rob’s unit is quite small and from the living area I was able to see into his bedroom, kitchen, bathroom, and out his backdoor to the common area. Since his unit was small and I had nearly unrestricted viewing of almost every room, I was able to take note of the space and objects in his home. For example, the size of Rob’s refrigerator was quite large for one person. It is a 520L refrigerator which is more suited to a family of four12. The refrigerator can be seen in the image below:

By observing the space and seeing the refrigerator myself I was able to introduce that in the interview as a point of conversation. The excerpt can be seen below:

**Transcript 2 in-home (Lines 162 – 167)**

Andrew: Any idea what that might be have you got something that uses a lot of energy  
Rob: a big ass fridge that I don’t need  
Andrew: I’ve noticed it was quite a big fridge for one person.  
Rob: I got for free. Like It’s a good fridge but I don’t need a big fridge like that. But I can’t see that being the problem like I run an electric stove but I don’t cook that much anyway. Most of the light bulbs and energy saving.

When Rob categorised the refrigerator as being “big ass” I stated that I have observed his refrigerator and agree with his assessment. This prompted Rob to provide a reason for having his big refrigerator. He then states that he does not need a refrigerator that size. This sequence allowed me to identify an object within the space and use it as a talking point in the interview which provided further data. This extra information informs me that Rob knows his fridge is too big for him but he got it for free. This extra information corroborates his response in the following sequence:

**Transcript 2 in-home (Lines 273-275)**

Andrew: And you said you got that fridge for free but did you think the stickers would influence your decision to buy a new appliance, looking at the stickers?  
Rob: Nup. Cost

Comparing this information to an excerpt from the telephone data shows a similar situation with a different result:

**Transcript 2 Telephone (Lines 143 – 146)**
Andrew: so you have two uh a second fridge do you have a second [freezer] by any chance
Jen: [yes I do] uh yes it does it’s quite a small freezer in it though
Andrew: ok what water temperature do you use to wash your clothes

In this excerpt, Jen answers the question and then volunteers extra information regarding the size of her second freezer. Immediately after that assessment I move on to the next question; in Rob’s interview I was able to introduce an observation with the outcome of an explanation and more data. This is one instance where space and objects were used in the situated moment of the interview as a tool which provided more information. The telephone interviews in this research did not afford the introduction of observed space and objects to the conversation. Therefore, the observation of space and objects was unique to the in-home phase of the research.

2.4 Phase 1 – Telephone

Phase one of this research involved undertaking a telephone based interview to gather user data to inform the design of a Gamification architecture. This phase was comprised of recruiting participants, undertaking a telephone based interview, and developing as much as possible of the initial Gamification architecture from concepts grounded in the interview data. Phase one addressed research question one:

1. What player focused Gamification architecture elements can be derived from telephone data?

2.4.1 Recruitment of Participants

Convenience sampling (Patton 1990, P180) was used to recruit ten telephone interview participants. Ten participants were deemed sufficient for this study, as the results are not being generalised therefore representativeness of population is not relevant in this case. The initial contact with participants was made via telephone and an agreed upon time for the interview was negotiated. In most cases, the participants asked to be phoned back after the recording software was activated in order to complete the interview there and then.

2.4.2 Conducting the Interview

The telephone component involved administering the 44 interview questions to ten participants via telephone. As mentioned previously the interview was structured into five parts, following Robson’s sequence as a guide. There were no concerns either ethical or otherwise raised by any of the telephone participants and all of them agreed to participate in the study with no form of remuneration. After informed consent was obtained, the interview portion commenced. There were
some instances of a line of questioning being followed which deviated from the guide. However, the majority of the time saw the interview question guide being followed without much deviation.

Each telephone call was conducted on an android based mobile phone (Samsung Galaxy S3), which had recording software installed. After the call was completed the recording was then transferred to a computer where the data was transcribed for analysis.

2.4.3 Developing the Player Focus

The Player Focus section of the architecture acts as an intermediary device between intended users of the system and the system designers. Developing the architecture in this instance involved being able to draw links between the questions asked, the themes and concepts, and the Gamification elements required. Understanding how the questions relate to the Gamification elements provided direction for where specific themes and concepts fit into the Gamification elements.

The organisation of the ethnographic findings to create elements of the Gamification architecture was modelled after Participatory Design methods. Specifically, this research used a modified method of the “Video Analysis Wall” (Schuler and Namioka, 1993 p149) which uses a wall or whiteboard to construct a collage of ideas, issues, and design opportunities. The method was modified in the sense that instead of using video data, the textual analysis was used to represent the user data. The below image provides an example of what this whiteboard looked like:
The initial development stage involved analysing the ethnographic data for relevant findings. These findings were then operationalised in the form of a persona which is described in detail in Chapters Three and Four. The personas served as a focal point for organising the themes emerging from the data. This allowed concrete links to be drawn back to the data to minimise conjecture.

Scenarios were then developed by using the above whiteboard technique to represent regular actions the personas might undertake with the system. By mind-mapping the expected behaviours that the personas might undertake relative to the proposed system activity, the creation of scenarios were able to be produced. This allowed a narrative to be written which would envision how the personas, representing user types, would act out that specific scenario.

Finally, the expected stages of mastery for each persona were developed by describing the expected behaviours of each persona at the relative level. This is also explained in Chapters Three and Four. These stages are based on the expected actions displayed by each player type identified in the telephone data.

2.5 Phase 2 – In-Home

Phase two of this research involved undertaking a face-to-face interview and an energy and technology use inventory in the participant’s home. The purpose of these methods was to gather information which may be used to develop amendments to the initial architecture. The purpose of the in-home visit is to identify if the in-home data offers anything extra than the telephone data for the purpose of this research. This phase was comprised of recruiting participants, conducting the fieldwork, analysing the data, and amending the initial architecture from concepts grounded in the data. Phase two addressed research question two:

2. What additional player focused Gamification architecture elements can be derived from in-home data?

2.5.1 Recruitment of Participants

Convenience sampling was used to recruit five households to participate in this phase of the research. The reason for this particular method of recruitment is due mainly to the difficulty in negotiating access to people’s houses (Bengry-Howell & Griffin, 2012), time constraints of this project, and resource constraints. Two of the five households withdrew from the study due to personal reasons. This is addressed in the Reflections on Design chapter later on. Initial contact with the participants was made via telephone and an agreed upon time and date was arranged for the in-home visit.
2.5.2 Conducting the fieldwork
As stated by Gustafsson et al., (2010) the majority of energy use in the home happens between the hours of 17:00 and 22:00. Therefore, the in-home visits were scheduled between the hours of 17:00 and 22:00; or near to that timeframe as possible. Four of the participating households accepted that timeframe, and one was unable to. The household that did not accept the time frame I visited at 14:00.

Upon arriving in the home, I greeted the participants and introduced my research. Participants were then provided with an information sheet and an informed consent form prior to their participating in the study. The timeframe for being present in the participant’s household was a maximum of three hours. This timeframe was to minimise the possible disruption to the participants’ social life (Bengry-Howell & Griffin, 2012). The interview was administered first, followed by the inventory and observation walk around. At the conclusion of the visit, I compensated the participants with a $50 Coles/Myer voucher per household for their participation in the study. This voucher was deemed appropriate as visiting and filming inside participants’ houses is invasive and a slightly larger incentive was required to encourage participation.

2.5.3 Identifying Additional Elements
The additional information gathered from the in-home phase was used to identify additional elements not present in the telephone data. These elements were of a visual nature and represent the main aspect that was unable to be attended to via the telephone; visual data collection.

The addition of a new persona to the player focus section of the architecture represents the findings of the in-home visits. These findings include a second page to the persona which demonstrates research artefacts discovered during the in-home phase. These artefacts were incorporated into the persona to provide empirical examples of electricity conservation behaviours being used.

2.6 Conclusion
While this research is concerned with developing the Player Focus section of a Gamification architecture, it is also focusing on exposing the ethno-methods used in the process of doing ‘ethnography for Gamification design’. Therefore, this methods chapter has described in fine detail the explicit methods used to undertake the activity of doing ‘ethnography for Gamification design’. The purpose of this level of detail is to leave a trail of methods grounded in research for other researchers to build upon.
3 - Telephone Findings (Phase 1)

The purpose of this chapter is to address the first research question: ‘What player focused Gamification architecture elements can be derived from ethnographic telephone data?’ This question was developed based on the gaps identified in the literature review. This chapter explores the analysis of the telephone data and how the findings can inform the design of the Player Focus section of a Gamification architecture.

A general overview of the analysis finds that detailed Player Focus information can be created from ethnographic telephone data. The use of an ethnomethodological analysis of the ethnographic data looked past the reported information provided by the participants and analysed the structure of the question and answer sequences to determine underlying methods. These methods were then used to guide the creation of the Player Focus section of the architecture.

3.1 Player Types/Personas

The telephone data provided empirical grounding for the creation of three separate personas to communicate the findings of the analysis. Each persona represents specific findings in the data deemed relevant in relation to this case study. These personas are Anna – The Bottom Liner, James – The Clarification Seeker, and Graham – The Explorer. Each persona will now be introduced with an analysis of their creation.

3.1.1 Anna – The Bottom Liner

![Anna Persona](image)

**Background**
- Anna is not too sure about electricity concepts and how they are used.
- She doesn’t use the scientific terms at all.
- She really only thinks of electricity in terms of money.

**Demographics**
- **Age:** 21
- **Occupation:** Student
- **Education:** High School
- **Marital Status:** Single
- **Housing Status:** Rent
- **Children:** None

**Needs**
- Electricity concepts need to be clear for Anna.
- Kilowatts and Kilowatt Hours are not used by Anna.
- Anna conceptualises power and energy as dollar figures.

Figure 3.1.1 – Anna Persona
Anna was created to represent the findings of how the terms of power and energy are communicated. The below analysis identifies that this is a two part phenomenon. First, the scientific terms of kilowatts and kilowatt hours are not used to communicate power and energy. Second, in the place of these terms, monetary values are used to communicate electricity use.

3.1.1.1 Unknown Scientific Units

Presenting the participants with the scientific units for electricity and energy presented a knowledge shortfall. Or in other words, what Heritage (2013, p370) posits as an epistemic issue; “the knowledge claims that interactants assert, contest, and defend”. The epistemic issue here is the inability to answer the question posed with an answer that demonstrates the understanding of scientific units. The questions themselves were attended to and had answers provided as the below examples illustrate. However, those answers were utterances that voluntarily explicate a lack of knowledge. The concepts of kilowatt and kilowatt hour were unknown for eight of the ten participants. This caused the participants to be unable to answer the question posed to them. A typical response to a request for the difference between a kilowatt and kilowatt hour was an admittance of not knowing the answer, for example:

**Transcript 1 (Lines 141-143)**

Turn A Andrew: What is the difference between a kilowatt and a kilowatt hour
(2.7)

Turn B Kate: I’m not one hundred per cent sure on the difference

**Transcript 2 (Lines 121-122)**

Turn A Andrew: ok what is the difference between a kilowatt and a kilowatt hour

Turn B Jen: umm I’m not too sure sorry

**Transcript 4 (Lines 108-110)**

Turn A Andrew: fair enough alright do you know the difference between a kilowatt and a kilowatt hour

Turn B Phil: no not a clue hehe

**Transcript 6 (Lines 70-71)**

Turn A Andrew: alright do you know the difference between a kilowatt and a kilowatt hour

Turn B Karen: no

In each of the above cases, Turn A is comprised of a request for information concerning the difference between two scientific units and Turn B is the response to the request. The answers given by participants were all clear with no clarification of the initial question required; as was demonstrated in the technology questions. The responses to the questions indicate that the participants did not know the difference between a kilowatt and kilowatt hour; two common used
scientific terms for power and energy. This question was the only one that introduced the concept of scientific units in the interview.

There were two participants who were able to provide an answer to the question regarding the difference between a kilowatt and kilowatt hour. The two answers can be seen below:

**Transcript 3 (Lines 138-141)**
Andrew: ok alright what is the difference between a kilowatt and a kilowatt hour
Jake: uh a kilowatt is a measure of energy
Andrew: mhmm
Jake: a kilowatt hour is the usage within an allotted timescale

**Transcript 5 (Lines 141-146)**
Andrew: ok, now just got a few more questions about home energy use, what is the difference between a kilowatt and a kilowatt hour
James: well kilowatts is the amount of is is is power whereas kilowatt hour is the amount of actual power used in one hour number is the number of kilowatts being used in one hour

Jake responded to the question by providing independent definitions for the two terms over two utterances. Jake began by providing an inaccurate definition of a kilowatt being a measure of energy (it is a measure of power). Jake proceeded to define a kilowatt hour as usage within an allotted timescale. Interestingly, Jake used an ambiguous measure of an “allotted timescale” rather than the accurate measure of one hour. Jake provided two responses to the initial question of the difference between two scientific units. Jakes responses did not accurately cover the initial question of the difference between the two units. However, without knowing basic definitions, demonstrating the difference between the two units may prove difficult.

James responded to the request by providing an accurate definition of a kilowatt. He then immediately continues his utterance to provide an accurate definition of a kilowatt hour. James had no demonstrated difficulty providing a response to this question with accurate definitions. James related the two definitions with the common word “power”. He defined a kilowatt as a measure of power, and kilowatt hour as a measure of power of a one hour period. James then concluded by returning to the scientific unit of kilowatts being used in a one hour period to provide a more technical definition of kilowatt hour.

In these data I found three categories of people describing scientific units. Those who admit they did not know the units, one person who presented a response and was incorrect, and one person who presented a correct response to the question. This is not a surprising find in the data as this question which prompts people to use the scientific terms for electricity was the only actual instance
throughout these data where the terms “kilowatt” or “kilowatt hour” were uttered. The most common reference system for conceptualising and communicating electricity use was through the use of money as an accounting mechanism. This is important as it demonstrates empirically that domestic energy consumers do not use the scientific units to communicate power and energy. By understanding from a player focus, the main way of communicating power and energy, design decisions can be concluded for the system. These decisions are introduced in the following sections. The scientific terms of kilowatt and kilowatt hour appear to fall short of providing a meaningful reference system for domestic electricity use. The use of money as an accounting mechanism was omnipresent throughout these data when participants were referring to power or energy. The next section will introduce the phenomenon and provide examples of it in the data.

3.1.1.2 Money as an accounting mechanism

A phenomenon observed many times throughout the data was the use of money as a reference system to make energy use accountable. This may stem from the participants’ lack of demonstrated understanding of the scientific units of kilowatt and kilowatt hour; however the data does not directly show that association. This is similar to Schwartz et al. ’s (2013) finding that people link energy consumption to their daily habits by relating abstract measured values to something concrete in their experience. The following sequences illustrate this phenomenon:

**Transcript 3 (Lines 109-112)**

Andrew: oh why do you think it’s high yeah
Jake: why do I think it’s high umm because of the bill it costs and astronomical amount of money to run this household for some reason I do have a lot of stuff running all the time my fridge I believe consumes a lot of energy

**Transcript 7 (Lines 54-58)**

Andrew: alright now just a few questions about your home energy use would you describe your household energy use as low medium or high
Max: uhh low
Andrew: ok why do you think it’s low
Max: umm I dunno our bills are all about two hundred bucks

**Transcript 9 (Lines 124 - 129)**

Andrew: so would you describe your household energy use as low medium or high um bearing in mind you’ve only been there for a few months so
Eddie: yeah yeah cause I just I haven’t actually got a power bill yet but but I would probably say I mean if you consider it’s only a few people living in a three bedroom

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13 Jake’s domestic energy use
These excerpts demonstrate how when posed with a question that requests an assessment of their energy use, the participants used a monetary item to account for their energy use. In this instance the item is their power bill, which, is what they are using to assess their consumption.

In transcript 3, when prompted for an explanation for his evaluation of his energy use Jake relates the running of the household (in an electricity context) to a monetary theme. Not only does Jake relate his domestic energy use to money, but he demonstrates his evaluation of his use as being “astronomical” or, very high. Jake then relates his monetary evaluation of being “astronomical” to a specific energy appliance. By relating this to an appliance he is demonstrating that he sees energy use, not only in terms of money, but also, in terms of appliance use. In transcript 7 when prompted to justify his self-evaluation of his energy use, Max uses the monetary value of “two hundred bucks” to justify his statement. Max’s utterance in line 58 is doing three things in this excerpt. It demonstrates that Max uses money as an accounting mechanism for energy use, the average bill for Max is about $200, and Max views a bill of $200 as low amount for his energy bill. In transcript 7 Eddie provides a statement of inoculation against a possible wrong answer by stating he does not have his power bill yet. This demonstrates that in order for Eddie to make an accurate assessment he needs to have his bill on hand. Eddie then performs an uncertain assessment on his energy use due to the absence of his bill.

These sequences show how difficult units of measurement, such as kilowatt hours and kilowatts fall short in providing accounts for domestic energy use. As demonstrated above in the “Unknown Scientific Units” section many people struggle when presented with these concepts. The participants used their own accounting mechanism of money to understand and communicate electricity use. With the absence of a link between energy use and monetary value, for example a power bill, people resort to uncertain assessments of their energy use. It is clear from the data, that the participants are more comfortable with expressing electricity and energy use in the form of monetary units than the scientific units of kilowatts and kilowatt hours. What this data demonstrates is that the scientific units of kilowatts and kilowatt hours were not used by the participants to communicate power and energy. The participants formulate an accounting mechanism of money in relation to energy use in the home. This result is reminiscent of Schwartz et al.’s (2013) finding that money is used as a universal accounting instrument for domestic energy use. Abstracting information about domestic energy use in the form of monetary values could be a potential path to explore for a Gamification system for domestic energy use.
The identification of the way in which people have developed their own accounting system for electricity use where traditional scientific terms fall short is exhibited in Anna’s persona. Understanding how participants communicate electricity in terms of money will allow an understanding for the design team to develop a user focused system.

Anna’s persona brings to light a behavioural change design choice. The choice to address this design issue is the choice between treating Anna’s understanding as an addressable issue of education and design to change or improve it. Or, the alternative is to embrace Anna’s understanding of scientific units in terms of monetary values as a member’s method and design to leverage this understanding. For example, the choice of addressing the education could address the identified problem with this persona’s understanding of scientific concepts. This would involve attempting to separate the concept of monetary values as an accounting system and replace these values with the scientific concepts. Whereas the monetary approach might be to continue abstracting the scientific concepts in the already present terms of monetary values and focus the user on simply saving money (electricity). Both of these scenarios are equally viable and both could be designed into the device.

From a methodological viewpoint, the ethno-methods made available by the participants were identified as generating a possible ‘fork in the road’ for design where different directions can be taken. Therefore, by incorporating these elements into Anna’s persona, this presents the findings in a way that can be evaluated and a direction decided upon. Thematically addressing the data would produce different results than that of analysing member’s methods. Taking the analysis to a structural level identified more nuanced information that would not be present in a standard thematic analysis of these data. The ethnomethodologically focused observation that the substitution of a familiar concept in-place of an unfamiliar one was operationalised into Anna’s persona. This persona demonstrates how this member’s method can be used to inform design by introducing possible design paths.
3.1.2 James – The Clarification Seeker

James was designed to communicate the instances of clarification seeking in the technology use questions. In contrast to Anna, James’ persona represents methods used by participants when attending to questions. This is not an epistemic issue, but more of a clarification seeking issue. This stemmed from participants demonstrating they had knowledge of how to answer the question, but they requested confirmation of how to do so. This was a subtle method demonstrated by participants as a way in which to mutually work with the interviewer to achieve understanding could easily be overlooked. This was not so much the content that was the interesting find in these data, but it was the method by which the content was achieved. These instances of requests for clarification, demonstrated by the participants, replace the expected answer which Houtkoop-Steenstra (2000, P.23) describes as “Displaying understanding of the prior talk”.

The technology based telephone questions are comprised of eleven focused questions concerning internet, social media, and video game use. With the questions being asked of ten participants, this provided 110 question and answer sequences. Out of these 110 sequences, there were only five sequences which were identified as requesting clarification. Each of these sequences produced a request for clarification (Hutchby and Wooffitt, 2008) from the participant who was seeking clarification on the initial question. These requests propose the previous turn was not sufficiently clear for the participant. These requests for clarification were all identified as requesting a definition concerning the initial question. Two questions were focused around the clarification of what ‘social
media’ is; two questions requested explanation concerning what a ‘game’ is, and one question enquired about the nature of computing technologies present in the home. The below excerpts demonstrate the sequences and how they were repaired during the interview.

The first question that resulted in clarification being sought for two participants was question 16: Please tell me about your social media use? What sites do you use? How often do you use them? What games do you play on those sites? A typical sequence for this question is the question being a request for information and a relevant answer as the below excerpt demonstrates:

**Transcript 9 Lines 77-78**

Andrew: ok cool uh so you said you use um social media which sites do you use  
Eddie: uh just Facebook

There were two instances of the clarification being sought for the above question by the participants. Both of these participants responded to the initial request with an inserted request for clarification of the term ‘social media’. The excerpts are below:

**Transcript 5 Lines 65-74**

Andrew: ok fair enough ok so um would you please tell me about your social media use so which social media sites do you use?  
James: In what way  
Andrew: umm  
James: When you mean social media  
Andrew: ok, do you use any sites such as Facebook or Twitter or Google Plus?  
James: Um Facebook, I’ve got an account but don’t use it I’ve got a few friends on there, basically if I’m going to contact someone I’ll jump on the telephone and ring them have a chat, mainly because my typing skills are not that good  
Andrew: ok

**Transcript 8 Lines 57-60**

Andrew: alright and do you use social media, any social media websites  
Bec: like Facebook  
Andrew: yes  
Bec: yep occasionally I’ll log on but not very much

The above two transcripts both began with a standard request for information being asked of the participant. The request started out broad asking about social media use and then it was reformulated to ask for specific social media sites used. Both participants provided a request for clarification concerning social media. James provided further information to attend to his request by
stating “In what way”. This allowed the question to be rephrased as a more direct question asking if he uses any of the three specific and common social media sites listed. The sequence was then repaired and James continued on to provide the expected answer. Whereas Bec provided a candidate example which she was expecting feedback for. After the interviewer replied to Bec by confirming her proposed example was correct she then concluded the sequence with the answer to the initial question. The clarification seeking request in these sequences was attended to when a specific candidate example of a social media platform was introduced in to the sequence. The provision of an example of social media allowed the sequence to be answered and progress the interview. These were the only instances of clarification seeking encountered with the social media questions.

In this instance, insertion sequences were used to signal that clarification was being sought. Also, the insertion sequence provided the relevant opportunity to provide a specific example to attend to the request for clarification. This led to the question being answered and the answer deemed appropriate with the beginning of a new sequence following the answer.

The second topic that required clarification for two participants were questions concerned with games. The questions containing the topic of games were questions 16, 17, 18, and 19 (See Appendix B for the question guide). A typical sequence for asking these questions is as follows:

**Transcript 6 Lines 45-54**

Andrew: mhmm and do you play any games on Facebook at all
Karen: no
Andrew: ok um what about on your Xbox
Karen: not really Mark uses that mainly
Andrew: ok and what about your smartphone are there any games or any apps on there that you play
Karen: umm yeah I play the like word find and things like that
Andrew: mmk do you use any applications or anything on your phone to help track your behaviour such as brain training weight loss or exercise applications
Karen: no

Eight of the participants provided no observable instances to demonstrate a request for clarification when presenting a valid answer to the question. However, there were two instances in the data of non-typical responses to these questions concerning games. Unlike the social media clarification above; the definition of the word ‘game’ was introduced as the element requiring clarification in the question. Both participants were seeking clarification on the category of game the question was focusing on in this context as the below transcripts demonstrate:
Transcript 8 Lines 64-77

Turn A Andrew: alright but so you do play some video games which ones do you play
Bec: video games
Andrew: yeh do you play any on your iPad or anything like that
Bec: oh there’s some like some apps you mean that we play
Andrew: yeah yeah
Bec: yeah there’s a couple on there
Andrew: mhmm [how of-
Bec: [you me]an games
Andrew: yeah um are there any games in particular that you you play
Bec: I don’t know what the name of it is hang on I’ll tell you (3.5) I’m just looking it up now
Andrew: that’s alright
Turn B Bec: I look at- I play something called lucky stars
Andrew: mmmm

Transcript 9 Lines 99-108

Turn A Andrew: ok alright and what type of games do you like to play what what sort of games do you look for uh if you think aww I want to sit down and have a bit of a game
Turn A1 Eddie: Like on like the social media type game or
Turn A2 Andrew: yeah on social media on Facebook um if you wanted to look for a new game is is there a specific type you like uh action games adventure games or these ones where you have to guess songs
Turn B Eddie: yeah like I don’t I don’t normally actually go looking for them some people just like invite me and that’s how I start playing them but but yeah generally I’d play the games where you’re playing against somebody
Andrew: mmmm

In the above excerpts, both Bec and Eddie request clarification on the definition of a game in the context of this interview. Bec produced three requests for clarification before the appropriate response is achieved to the original questions. These requests all focus around the definition of video games. The initial request on line 65, the follow on request on line 67 and the final request on line 71 all point to the fact that Bec is having difficulty demonstrating understanding of exactly what a video game is in this context. A resolution is reached when I ask a focused question which asks for particular games she plays. Whereas Eddie seeks clarification by providing a type of possible game that can be played. I then rephrase the question in a more conversation-type approach and suggest types of games to help him construct his answer. After that, Eddie returns to the initial sequence and produces an answer for the original question. As these examples demonstrate, requests for clarification were present in these sequences with the purpose to seek clarification. This
clarification on what a game is in this context was negotiated with the participant until mutual understanding was reached and an answer was presented (Turn B).

The final topic that caused an isolated incident of clarification seeking in the technology questions was the understanding of what is incorporated by ‘computing technologies present in your home’. This sequence is straightforward with a request for clarification being used to determine whether the answer produced is sufficient for design purposes. The excerpt below demonstrates this isolated incident:

Transcript 9 Lines 27-32

Turn A  Andrew: what computing technologies are present in your home for example desktop computers laptop computer iPad Android tablets smartphone uh video game consoles
Turn A1  Eddie: is that uh including like my flatmates or
Turn A2  Andrew: yeah any at all
Turn B  Eddie: oh ok yep all I know is that he does have a laptop and I’ve got one as well

In the above excerpt Eddie seeks clarification for what constitutes ‘computing technologies present in your home’. He seeks to clarify if his flatmates technology devices are incorporated in the category of computing technologies in the initial question (Turn A). The insertion sequence of Turn A1 and Turn A2 address this request for clarification quickly and allow the interview to progress into the answer (Turn B).

The presence of clarification requests were isolated throughout the question data with only five instances being identified. Each of these instances identified a request for clarification about the initial question which was attended to in an insertion sequence. The insertion sequences allowed successful negotiation of the clarification request so the participant could display an understanding of the prior question.

This observation of requests for clarification was operationalised in the creation of the persona James. The fact that participants did not adhere to a strict question and answer framework, but they attended to instances of talk in a moment-by-moment situated manner by inserting sequences to seek clarification. This demonstrates that participants, and as Garfinkel argues everyone, are not “cultural dopes” (who act out of standardised directives) and will employ methods to both demonstrate and achieve understanding of a specific social setting. Therefore, this is reflected in James’s persona by noting his ‘clarification seeking’ characteristic. Much like Suchman’s research which saw the users of the photocopy machine ‘seeking clarification’ to address where the
technology stops; this persona of James illustrates this phenomenon, grounded in empirical data. The way in which this persona demonstrates the need to seek clarification shows that this is a mode by which these participants come to understand the world.

James’ ethno-method of clarification seeking shows that in the absence of the required information the participants use their own methods to seek clarification. This practise of ‘clarification seeking’ demonstrates a subtle difference between someone who has a lack of knowledge of something (Anna) and someone who thinks they have the knowledge to answer the question, but seeks to ensure they are addressing the correct issue (James).

Similar to Anna’s persona, this offers design choices. Design with specificity in mind, so the need for clarification is satisfied from the beginning. Or, trust that the user will seek clarification, which allows a more intuitive based design. James’ persona is a way of taking the ethnomethodological observations of seeking clarification and encasing them in a ‘person’. The operationalisation seeking clarification itself offers a focused way in which to base possible design decisions.

3.1.3 Graham – The Explorer

![Graham – The Explorer](image)

Graham is designed to represent existing electricity use behaviours present in the data. These behaviours are central to the phenomenon of ‘exploring’ electricity use. The explorer, similar to Bartle’s (1996) “Explorer” player type encompasses behaviours that demonstrate the participants are trying to get a sense of their overall electricity use. This explorer persona can easily transfer into
the Gamification architecture as behavioural trait of someone looking to gain a detailed understanding of the entire gamified system. In contrast, James, the Clarification Seeker, represents users who are not interested in knowing everything about the entire system. James represents users who want to know about a specific element, or to seek clarification about a specific mechanic. The first behaviour is the comparison of electricity use to other people. The second behaviour is an ad-hoc method of tracking electricity use described in the data. Both of these methods are a form of exploring electricity use, therefore they are designed into this persona of Graham – The Explorer.

3.1.3.1 Comparison of energy use
Comparison of energy use has been widely studied in social psychology and environmental psychology (for example, Midden et al., 1983; Brandon and Lewis, 1999; Petersen et al., 2007; Petkov et al., 2011; Schwartz et al., 2013). The motivation for comparison of energy use can be traced back to Festinger’s (1954) theory of social comparison. This theory proposes there is an internal drive to gain self-evaluation by comparing against others. Opinions and abilities are measured against other people such that the person may reduce any uncertainty of their own. In this research there were some isolated instances of comparison. On their own, these instances are not noteworthy, however, as a mechanism to understand and communicate electricity use they are important.

Comparison of energy use, according to Karjalainen (2011), can be categorised in one of two groups, historic or normative. Historic comparison allows consumers to compare their use to previous aggregate local use. Normative comparison is when people compare their use against that of other people. There were explicit examples of normative comparison present in these data. Three sequences which demonstrate comparison to form a reference point for participants’ own consumption have been taken from the data to illustrate its appearance. For example:

**Transcript 5 (Lines 229-234)**

Andrew: ok and what would motivate you to reduce your home electricity use uh for example monetary incentives, competition, setting goals and achieving them
James: probably monetary um like I say my energy use is pretty low we keep it pretty well controlled and I've compared it to other people in similar circumstances and ours is considerably lower so if somebody wanted to give me a bit more discount off my power bill yes that would be great

**Transcript 8 Lines (230-232)**

Andrew: do you think your energy bill is too high
Bec: hehe umm what I’m paying for it yeah *laughing* when I have to pay the money it’s hard but no compared to probably other people that I’ve spoken too yes it’s high

**Transcript 7 (Lines 54-60)**
Andrew alright now just a few questions about your home energy use would you describe your
household energy use as low medium or high
Max uhh low
Andrew ok why do you think it’s low
Max umm I dunno our bills are all about two hundred bucks
Andrew mhmm
Max so pretty comparatively low

In these excerpts, the participants all express the phenomenon of comparing their energy use to
other people’s use as a form of reference point. These three sequences demonstrate that the
phenomenon of comparison is used as a method of accounting for energy consumption. Two of
these excerpts compare use to other people, and one is unknown to which the comparison is made
with the data provided. This finding echoes that of Schwartz et al. (2013) who found that their
participants used others consumption as a point of reference for their own. The use of comparison in
the data demonstrates that the person has interacted with another energy user and compared and
 contrasted a resource that they deem appropriate to illustrate their energy use with. The participant
used a resource that is mutually intelligible to each party as a metric which can be used to compare
and evaluate their use in relation to the other person. It is not known from the data if the resource
was in the form of an energy bill, measures of kilowatt hours, measures of money, or personal
experiences. Probing for further information about the resource used would, in hindsight, be a
valuable source of further information, but, this kind of probing for mundane methods used by
people may cause the participant to get upset or irritated at the line of questioning.

Prior research by Abrahamse et al. (2005) has found that electricity feedback presented in a
comparative way evokes motivations such as competition, social comparison, and social pressure.
These motivations have been demonstrated in several studies reviewed by Abrahamse et al. to
encourage electricity conservation habits in participants. The normative comparison present in these
sequences demonstrates that people are actively comparing their electricity use to other domestic
users.

A different form of comparison was also present in these data which allowed the linking of money
as an accounting mechanism and a semi-historic comparison. This comparison compared money to
electricity use in order for the participant to make an ad-hoc method of tracking her electricity use.

### 3.1.3.2 Ad-hoc Method of Tracking

Many improvements and solutions to a problem arise from ad-hoc methods used to create a solution
to an existing issue. In the telephone data there was one instance of a participant describing an ad-
hoc method of tracking her energy use. The complete sequence can be seen below:

Transcript 2 Lines 91-119
Andrew: ok do you have a mon- uh any monitoring devices for your electricity use
Jen: no we don’t in this house but in our previous rental we had um pre-paid electricity which I used as a monitoring device
Andrew: ok can you tell me how that works
Jen: yeah defin- so um in New Zealand you’ve got the option of pre-paying electricity they generally have it in shared houses how you’ve got um your power meter and its got little slots where a card could go in it
Andrew: mmmm
Jen: um you can get top ups you can top up over the phone using a credit card or you can go down to um there’s a whole list of service stations
Andrew: mmmm
Jen: that offer it and you can just go buy a top up card like you’d buy a pre-paid phone card
Andrew: yep
Jen: um you pop it into the electricity meter and it counts down how much you’ve got left
Andrew: ok
Jen: and shows the sort of rate you’re being charged and that
Andrew: oh right and how did you find that compared to just um like running up an electricity account which which do you prefer
Jen: um I prefer having the pre-paid electricity cause you sort of know you’re paying it in advance so you can sort of look at it and go ooh wow I’ve used you know ten dollars really quickly
Andrew: mmm
Jen: so the next bit I better be you know conserve more
Andrew: mmk
Jen: and I guess it sort of also works well in the instance of share housing because it holds people accountable for paying you know the power
Andrew: mmmm alright that’s quite interesting that

Jen introduces the concept of pre-paid electricity in a share house being used to monitor energy use. Her description of the method used is similar to how a pre-paid telephone system works. A card is placed in the power box at home and credit is purchased from either a reseller or over the phone via the telephone. The meter then counts down the credit left on the card, which as Jen mentions, she uses as a method to keep track of her energy use. The main difference between this method and standard billing is that pre-paid meters are paid in advance, whereas standard billing works on an account system. Jen addresses this by stating that an assessment can be made as the current card runs out and then she knows if she should conserve more for the next card. This is an interesting method, as it brings the effects of the energy related actions closer to the activities. This may allow behaviour patterns to be recognised as being wasteful or efficient.

The comparison of electricity use and the description of an ad-hoc method of tracking were used to inform the design of Graham. These elements of electricity use in the data demonstrates that ‘Graham’, as a person, has interacted with another energy user and compared and contrasted a resource that he deems appropriate to illustrate energy use. This means, that there exists some
evaluative mechanic by which people compare their electricity use. This mechanism acts as a metric that is mutually intelligible to each party which can be used to compare and evaluate their use in relation to the other person. It is not known from the data if the resource was in the form of an energy bill, measures of kilowatt hours, measures of money, or personal experiences.

From a methodological view, doing ‘being an explorer’ would encompass the ethno-methods of comparing electricity use and an ad-hoc tracking method. By having these methods in Graham’s persona, he can focus designers on exploring ways in which electricity comparison can be abstracted into the system. Also, again on the topic of abstraction, designers can focus on how tracking electricity use can be incorporated into the gamified system.

### 3.2 Player Stories/Scenarios

As mentioned in the literature review, scenarios are a fictional story that is used to exemplify aspects of the system design with the persona as the main character. The personas from the previous section have been operationalised by placing them in a narrative of specific system goal use. Two scenarios have been developed based on the original focus on the system design; to conserve electricity in a gamified way. These scenarios are representations of what Cooper (2004) calls daily-use scenarios which represent the main actions that each user will perform on a regular basis. For the purpose of this research, the below scenarios have the assumption that the system is on a seven inch tablet device. The two scenarios are:

1. Use the system to examine energy use
2. Challenging another user to an energy saving competition

The scenarios are italicised and the analysis and reasoning of each scenario is in regular font beneath it. Some arbitrary elements of the scenarios are fictional. For example in the first scenario below James decided to look at the device after seeing an advertisement on television. This element is not intended to inform the design per se, it is used to help construct the narrative that the personas fit into.

The development of the scenarios was a carefully thought out process with brainstorming to draw links back to the empirical data present in the personas. The below image provides an idea of the mapping process:
The personas were arranged alongside the two scenarios to create six boxes to incorporate thoughts, ideas and links. This turned out to be a largely creative and intuition based process. Establishing links to the empirical data was possible, but it included to varying degrees of abstraction. The specific reasoning for the scenario designs is explained under each scenario below.

3.2.1 Scenario 1 - Use the system to examine energy use

3.2.1.1 Anna

Anna decided to use the device to explore her previous electricity use. She taps the “Energy Use” button on the device and looks at the default “Daily Use” screen. She is a little confused about the graph which has hourly intervals on the x axis and kilowatt hours on the y axis. She then works out that it is kilowatt hours used for that particular hourly block. She looks to the side of the graph and taps the “$$\$$” button which switches the scientific units into dollars relative to her tariff. Anna is pleased with this as it allows her to understand her previous use in a concrete concept of dollars. Anna now understands that she used $2 worth of electricity when she used her dryer earlier in the day and commits to herself that she will try not to use it unless absolutely necessary.

Initially, the two possible design choices were written on the board to help focus the possible actions Anna in the scenario as can be seen in the below image:
The focus of education was chosen as a basis for the scenario, as it appeared to have the greatest overall benefit. Initially, the concept of changing dollars into scientific terms and vice versa was listed. This was because it encompassed the two main findings from the data; unknown scientific units and money as an accounting mechanism. Addressing these findings make up the main focus of the scenario which is concerned with allowing the display of electricity use as scientific units or monetary values. Also, this scenario introduces the affordance of switching between the two abstractions known as code switching. Auer (2013) suggests that switching codes during bilingual conversation will help the understanding of new foreign words. This is similar in this research as understanding energy and electricity use in terms of monetary values is almost a separate language than the standard scientific terms.

Anna’s confusion about scientific units is demonstrated in the scenario through the inclusion of words such as “confused” and “allows her to understand”. The scenario illustrates specific points that could be confusable, and strives to communicate them as such, for example; the scientific units of kilowatts, kilowatt hours, x axis and y axis. The scenario demonstrated how Anna looked for a solution to overcome her epistemic issue by finding an abstraction (in this case money) for her to be able to interpret the data. Then the ability to view the values in terms she understands (monetary values) is pleasing to Anna. Being that Anna represents the way the participants communicate electricity information; it is fitting that in this scenario she looks for a way to present the information in familiar terms. This leads into Anna understanding her energy use in terms of $2 which she was able to link to a previous action due to the information at hand.
3.2.1.2 James

James picks up the device after seeing an advertisement for an electricity company on television which stated that the average house uses 12 kilowatt hours a day. He taps on the “Energy Use” button and looks at the graph of his use for the day. James then selects ‘Monthly View’ which displays a line graph of his energy use over the last six months. Having a fast paced life; he likes the graphs and concise ways of showing his electricity use information. James is able to get a quick understanding of his electricity use relative to his historic use.

The salient elements of James’ persona that would contribute to the scenario can be seen in the below image:

Figure 3.2.1.2 – James Scenario 1

James’ persona is based around seeking clarification. He represents the specific user type who looks for specific understanding and examples, not just generalised terms. The focus of this scenario was on specificity of information, relative information, and presented in a fast or quick manner. Graphs are an efficient way of illustrating information in a concise and time dependent manner. Therefore, this contributed to the idea of exploring customisable graphs to represent bespoke user information. This is illustrated in the persona when James navigates to the graphs which summarise his data.

This illustrates the Clarification Seeker’s focus of not just using the device to explore his use, but, for a specific purpose to clarify understanding. This is reflected in the above scenario where he doesn’t just look at his use, he seeks clarification by viewing his daily use, and situating it with the monthly use graph. James also has a busy element to his persona which explains the inclusion of terms such as “fast paced” “concise ways” and “quick understanding”. The repetition of these terms
which denote ‘busy’ has been used to communicate to the designers that the information should be made available in a summarised manner.

3.2.1.3 Graham

Graham decides he wants to analyse his electricity use and develop a conservation strategy. Graham picks up the device and taps the “Energy Use” button. He begins to annotate his daily activities in relation to the hourly usage statistics. Graham taps on the highest hourly value from the day and the “Journal” opens up. Graham jots some notes regarding his use in the “Journal” and then exits that section. Graham then taps on the “Compare Use” button which takes him to the comparison screen. Graham looks at his use compared to other people with similar house size to him. He finds that his use is close to the average. Graham is happy with the information from the device and plans to export his annotated behaviours of high days to his email so he can work out what is consuming the most electricity.

The salient elements of Graham’s persona which contribute to this scenario are as follows:

Figure 3.2.1.3 – Graham Scenario 1

Graham’s persona is based around people who like to explore. Different ways of exploring were identified based on the information in the persona. These were to analyse, compare, annotate use, strategise, and try and go one-step-further. These elements were incorporated into the scenario early by stating Graham wants to not just look at his use, he wants to analyse it and develop a strategy. This is demonstrated by Graham making use of more time-consuming functions such as the “Journal” function which he uses to jot notes about his electricity use. By making use of the more time consuming activities in the system, Graham is demonstrating his explorer nature by trying to achieve an overall view. Graham takes the time to explore his use compared his use with other households and intends to further research his use by exporting his data to his email; illustrating that
Graham is willing to go one-step-further. Graham’s behaviours represent an explorer type who, in this context, is interested in every little aspect of the system and how it can be used.

3.2.2 Scenario 2 - Challenging another user to an energy saving competition

3.2.2.1 Anna

Anna picks up the device and taps on the “Challenge” button. She taps “Find a Challenger” and is paired with someone quite quickly. She reads the rules and understands that she has to conserve the most in 24 hours based on her average baseline to win. She begins by turning off lights and the space heater she has running. She checks her device and sees her immediate cost has dropped significantly. She is happy with this result. After about 45 minutes she starts to get quite cold and decides to turn her space heater back on; but this time just for a few minutes to take the chill out of the air. She continues this heater routine for the rest of the evening. At the end of the evening she taps on “Challenge” then on “My Progress”. She finds that the other person has saved 6% more than she has at this stage. She decides to be more conservative tomorrow and vows to not use the heater at all.

Figure 3.2.2.1 – Anna Scenario 2

Anna, who conceptualised electricity in monetary terms, thinks that turning off her lights and heater will cause her instantaneous power cost drop. She is happy that the resulting drop was caused by her actions. However, her need for clear concepts about electricity use is demonstrated when she turns the heater back on to combat the cold weather. She continues to turn it on and off throughout the night rather than search for an alternative to her issue. This could be because heaters present their use in terms of watts e.g. a 2000 watt heater. However, her lack of understanding of these concepts sees her using it intermittently. This scenario is demonstrating the possible steps that a Bottom Liner like Anna might take when using the competition mechanic.
3.2.2.2 James

James decides he wants to use the challenge function to save electricity this weekend. He taps on the “Challenge” button on the home screen of the device; this takes him to the challenge page. He clicks on “Find a Challenger” and waits for the system to link someone to him. He is paired with someone and the challenge rules are presented to him. He quickly glances over the rules and understands that he has 24 hours from the start to reduce his electricity use more than the other user relative to his average use for a 24 hour period. James begins by doing a quick walk around of his house turning off lights and appliances not in use. James then checks his device after each conservation action to see its effect. He observes that his total instantaneous power use has dropped by almost half. He then clicks on “Energy Use” to look at his average use for this time of day. He finds that he is conserving about 42% compared to his average use. He feels happy and thinks if he can keep this up all day he will win the competition.

Figure 3.2.2.2 – James Scenario 2

In this scenario, James’ busy lifestyle is reflected again by him undertaking a challenge on the weekend, and the inclusion of words such as “quickly” and “quick”. James’ persona trait of being willing to work a little is demonstrated by his progress checking and by his investigation of relative information. By investigating relative information concerning his conservation, James is finding tailored information which he can link to specific actions and examples of conservation behaviours. James’ walk around of the house demonstrates his willingness to work a little for clarification or in this case, information. He is treating this as a learning exercise by observing the effect of an action with the device. This is fulfilling two of James’ needs by providing him with specific examples which are tailored to his home. Being a clarification seeker, this example method of how James might act is exemplifying his persona traits in this scenario.
3.2.2.3 Graham

Graham thinks that a conservation competition might help him think of new ways to conserve electricity. Graham picks up the device and taps the “Challenge” button. He taps on “Find a Challenger” and is soon paired up with someone. Graham reads the rules and taps on “Begin” at the bottom. Graham immediately taps on the “Energy Use” button and clicks on “Journal” He then looks for the annotations made on the highest use days and identifies which behaviours consume the most electricity. Graham then turns off his air-conditioning, but he doesn’t worry about the lights as he knows they are energy efficient bulbs and use very low power.

Figure 3.2.2.3 – Graham Scenario 2

In this scenario Graham’s exploratory nature is demonstrated through his use of the competition mechanic to think of new ways to conserve electricity. As an explorer, the appeal of new ways to conserve electricity would most likely be a behavioural trait. This is designed into the competition part as Graham considering the competition as a gateway for him to uncover new ways of conserving electricity. He isn’t using the competition for the purpose of competing for fun, he is using it to explore his own habits further.

Graham reverts back to his previous electricity information in his device and examines the data including his own annotations. This is another method of an explorer, who, may not just explore their system, but use the system to explore their own historic data. Based on the information he identifies that his air-conditioner uses enough electricity to warrant turning it off and he does so. Graham’s exploratory nature is highlighted by his choice to leave the lights on. Since it is assumed an explorer would look at contributing factors to electricity use, Graham would be able to understand information and make an informed decision for his actions. Therefore, Graham identifies that his lights do not use much power and can remain on.
The personas were used to inform the scenarios by identifying the salient information in the personas and brainstorming how that information would be operationalised in each specific scenario. This allowed the scenarios to be based on the empirical information from the personas. Also, the scenarios included some fictional elements to build the narrative around the information.

As mentioned earlier in this section, scenario creation is largely an intuitive process. There are some areas of the above personas that incorporated empirical data, and the links are explicated. However, the narrative construction that goes around the empirical data is fictional. This is not an unexpected find, as interaction design is as much about creativity as it is about empiricism.

3.3 Stages of Mastery

The stages of mastery are important for understanding how the intended users may interact with the system. The stages of mastery are modelled after Zichermann and Cunningham’s (2011) stages which are Novice, Problem Solver, Expert, Master, and Visionary. The stages of mastery for this research are the expected levels of behaviour that the persona would demonstrate to make that level recognisably so. The idea is to operationalise these personas and explicate how each identified persona may progress through the system. This research found that stages of mastery is mainly an intuitive process with very little empirical basis to inform the sections. The stages are considered in terms of how the persona may act in those specific stages. However, it was seemingly impossible to draw conclusive empirical links from the various stages and the data. The below stages are representations of mastery levels and in actual fact; the observable mastery may differ from the desired qualities below. The stages are italicised and the analysis and reasoning of each stage is in regular font beneath it.

3.3.1 Anna

Novice

Anna has a thorough understanding of touch devices, but a limited understanding of this new system. She wants to save money on her electricity bill and believes this system will help with that. She is initially concerned that her lack of knowledge about power and energy will hold her back.

Anna is focused on the monetary benefit of using this system. She has concerns about non-scientific knowledge; however, the willingness to save money overarches that concern.

Problem Solver

Anna has visited the system’s wiki page a few times and reads peoples stories on saving money. She also understands how the competitive elements of the system work and has challenged several
people to competitions. She has saved about $50 on her bill this quarter and is happy with the results.

Anna visits the wiki page for the system, where she focuses her attention on money saving issues. Her quarterly saving is conceptualised as $50, as is identified in her persona.

**Expert**

*Anna engages on the Facebook page often with other users. She enjoys saving money on her electricity and doesn’t think it caused a significant impact on her lifestyle. She has loaded a custom skin on her system to make it more aesthetically pleasing and has it displayed on her kitchen table. Anna has also developed a basic understanding of the difference between a kilowatt and a kilowatt hour.*

Anna is becoming proficient with the system and uses the customisation feature to make it more aesthetically pleasing. She still has money as the motivating factor for using the system. She has also learned the difference between the scientific units of kilowatt and kilowatt hours.

**Master**

*Anna has made a habit of checking the device at certain times of the day. She has an alarm set on it to let her know when she is nearing her daily monetary target. She constantly reminds her housemate how much money is being lost by wasting electricity and that money doesn’t grow on trees.*

Anna is now using many features of the device including the alarm setting, which she set to go off when it hits a specific dollar value. She uses this device to help budget her electricity use congruent with her bottom liner persona. She is communicating electricity information to her housemate in similar terms that she conceptualises it in; monetary values.

**Visionary**

*Anna has some ideas about what she thinks might make the system better for her. She likes the idea of being able to view the use in terms of money. However, she begins to wonder if there is a way in which the system can take the terms of money use them to help teach other people about the scientific units of power and energy.*

Anna recognises her novice stage and begins to think of ways in which the system can help educate people in a similar way to her journey.
3.3.2 James

Novice

James is unsure of both the system and its functions. He is eager to save energy, but, he is unsure what exactly he can do to save energy. James begins experimenting by turning appliances off and on and viewing their effects on the device.

James wants to begin conserving energy; however at this stage he lacks the clarification of exactly which actions he needs to undertake to do so. He is motivated seek the clarification of which activities he can undertake by experimenting with different appliances. This information provides a novice stage of master for the clarification seeking user.

Problem Solver

James has been using the system for two months now and in that time he has reduced his energy use by 7%. James begins to start experimenting with shifting the use of specific appliances around and making tracked behavioural changes, such as washing in cold and hanging out his washing to see its impact. James also has liked the systems Facebook page and is beginning to look at other people’s conservation tips.

The next step for James’ persona is to begin experimenting with changing appliance use and also his behaviour. These actions will provide further clarification by giving specific examples of actions and behaviours that directly impact his electricity use. He is also looking at other people’s conservation tips to identify examples that he might be able to incorporate into his daily life.

Expert

James is familiar with his specific energy behaviours that have significant impact on the system. James doesn’t spend hours on the system exploring understanding its ins and outs. He just knows the specific areas of it which benefit him the most. He demonstrates his familiarity with the system by not requiring instructions on the system tasks.

At this stage, James has identified specific behaviours that impact the system. He is only interested in the parts of the system that directly benefit him. This is linked to his busy lifestyle and his inability to dedicate a long time to exploring features he may never use.

Master
James has a high level of understanding of the competition and tracking elements of this system. He uses the competition as a motivator to save both electricity and money. He uses the tracking to keep an eye on his use and attempt to understand any usage spikes in the data.

The two areas James benefits from the most are the competition and electricity use tracking. He has realised that these are the two areas which benefit from the specific conservation information he has generated from his experimenting. He monitors the device for any spikes in the data and seeks clarification on what caused that spike.

Visionary

James is beginning to develop ideas of his own to further the system and sometimes sends messages to the developers. However, he is busy and does not want to spend all his time improving someone else’s device.

James has a comprehensive understanding of the system which he demonstrates through his development of new ideas to further the system. However his busy nature trumps his willingness to contribute significantly to its development.

3.3.3 Graham

Novice

Graham has never used a digital system to help change his behaviours before. He is hesitant at the outset with this new technology, but is keeping an open mind. Graham is intends to be thorough with his understanding of this system since he has more time on his hands due to retiring.

Graham’s explorer persona is exemplified in the novice stage by his willingness to be thorough in attaining an understanding of the system.

Problem Solver

Graham is still finding his feet with the system. He has a thorough understanding of the historic use and comparison feature. He has only just started competing with other users and intends to master that element of the system next. His willingness to understanding the system from the ground up by exploring its specific ins and outs will help him achieve a comprehensive understanding of the system.

Being an explorer type who is dedicated to a thorough understanding has seen him progress a little slower through to this stage. He only has an understanding of two parts of the system at this stage, however they are both in-depth understandings.
**Expert**

Graham now checks his system every few hours and sets mini goals to use less energy on a daily basis. He has invited several of his friends to join the system and form a group to engage in the game elements of the system, such as competitions and badging.

Graham is looking for more people to compare his use with. He is actively recruiting new people to engage within the system.

**Master**

Graham now regularly interacts with the Facebook page and helps to guide new users into their system. He promotes the system as the way he managed to save hundreds of dollars a year on his power bill. Graham is an evangelist of this system; he loves to talk for ages about how it changed his habits for the better.

Graham has explored almost every part of the system and uses this knowledge to help new people. He tells his story of how the system has rewarded him and become an evangelist.

**Visionary**

Graham is now one of the contributors to a wiki designed to help people use less energy in their homes. He regularly experiments with new ways to conserve energy and reports to others on the Facebook page of his success or failure. Graham also tries to find ways in which the system falls short of supporting electricity conservation. He documents this information for future reference which he intends to communicate in a letter to the system designers.

Graham feels he has explored all he can in the system. Rather than pass on that knowledge piece by piece he feels he would be best to contribute to the online wiki resource. He has shifted his focus from exploring the system to understand it to exploring the system to identify where it falls short as a resource. His findings are recorded and intended to be sent to the developers.

Using the personas as a starting point allowed the development of the example mastery stages. These stages point out expected and desirable behaviours for various levels throughout the system. As mentioned previously, the empirical progression to mastery may be different to the intended one presented above.

**3.4 Conclusion**

Three personas were developed from the telephone data. Each persona focused on communicating different findings in the ethnographic data. The personas were then placed into a narrative which
constructed a scenario. The scenarios were developed to help communicate how the personas would act when undertaking common system tasks. Finally the stages of mastery were created from the original personas. This was achieved by understanding what each stage would look like for each specific persona type.

The use of identified phenomena and themes throughout the interviews allowed the grounding of the personas to be based in real ethnographic data. The grounding of the personas in real data is important as it removes much of the conjecture that could be applied to the creation of a persona.

Through the structure of responses that contributed to Anna’s persona the epistemic issue of lack of knowledge was operationalised to provide two ways in which the persona may inform design choices. The result of which is similar to traditional thematic or content analysis, but it arrived to the conclusion from a more ethnomethodologically focused structure-analysing way.

The practice ‘clarification seeking’ that was identified in these data was operationalised in the persona of James. A strict thematic or content analysis might argue that the participants reported using Facebook as their social media platform, therefore the design should be based around that knowledge. However, a more subtle, focused, and I argue, interesting point is the practice of seeking clarification. This ‘needle in a haystack’ method of attending to the question by seeking clarification to construct an answer looks past the obvious content and brings to light members methods by which they address a lack of understanding.

The focused data that provided empirical evidence for the creation of Graham demonstrated the exploratory nature of participants by illustrating their practises. This nature shows some participants work to achieve an overall view of specific systems; in this instance the system of domestic electricity use. The explorers have developed other ways of seeking understanding of this system; they have ‘explored’ it. Coincidently, this persona aligns with one of Bartle’s player types; The Explorer. It is interesting that this alignment was present. This demonstrates that analysing the structural way in which participants answer questions provides a persona that is very similar to the already used method of Bartle’s Player Types.

The telephone data allowed an understanding and description of what the interviewees did in terms of answering questions. From an ethnomethodological focus, looking past the observable themes and into the practises of the telephone participants allowed the data to be ethnomethodologically operationalised for Gamification design.
4 - In-Home Findings (Phase 2)

This chapter addresses the second research question: ‘What additional player focused Gamification architecture elements can be derived from in-home ethnographic data?’ This chapter explores the analysis of the in-home data and how the findings can inform the design of the Player Focus section of a Gamification architecture.

This chapter is concerned with identifying additional elements to inform the design of the architecture. The previous chapter determined that from telephone interviews can inform the creation of in-depth personas, scenarios, and stages of mastery are all possible. The same level of interview detail can be accomplished in a face-to-face format in the participants’ home. Therefore replicating those elements to re-establish that argument is not necessary in this chapter. Also, the previous chapter has established how the creation of personas can be used to inform both scenario creation and stages of mastery. In order to establish which additional elements can inform the design of the architecture, it is necessary to understand what additional data is available from in-home research versus over the telephone.

This research found the primary benefit of actually being in the participant’s home is the ability to record naturalistic visual observations. The home energy and technology inventory (Appendix D) was developed to help guide the initial visual observations. However, this inventory acted as static information recording device which provided information on what energy consuming devices are present. What the inventory did not include was the dynamic way people interact with energy used in their home. However, further ad-hoc visual observations encompassed a more dynamic set of data which paid attention to aspects such as, what was being used at the time of my being in the home and object placement that may indicate use of a device. Based on the observational data, one further persona was designed to communicate the additional in-home findings.
4.1 Persona: Sam – The Tracker

Sam – The Tracker

**Background**
- Sam runs a home-based catering business.
- She cooks all her meals in her kitchen and uses significant amounts of electricity.
- She monitors her use and tries to balance it with her solar generation.

**Demographics**
- **Age:** 37
- **Occupation:** Chef
- **Education:** High School
- **Marital Status:** Married
- **Housing Status:** Own
- **Children:** 2 Female

**Needs**
- A system that will make her energy tracking easier.
- A system that will distinguish between electricity use and solar generation.
- Something aesthetically pleasing as it is prominently displayed.

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**Sam – The Tracker (Artefacts)**

**Sam’s Tracking Book**
- Used where technology falls short
- Constant use—no missing days or data

**Sam’s Electricity Monitor**
- Displayed prominently
- Free of clutter
- No dust on it—indicates it is attended to

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Sam’s persona was created with primarily visual information from the in-home visit. The two main visual findings that provided empirical evidence for the creation of Sam were concerned with visual observation to introduce new data and the ability to confirm reported behaviour. The relevant visual
findings were incorporated into a second page to the persona. The second page provides concrete examples of artefacts and a summarised analysis of these findings intended to provide contextual information for designers. The two findings which lead to this persona will now be analysed in detail.

4.1.1 Introduction of New Interview Data

The first example of visual observation involved an inconsistency between what was reported by the participant and what was observed during the interview. This inconsistency lead to the introduction of an artefact used by the participant to record and track his electricity generation and use. During the interview portion of one in-home visit I identified an inconsistency with a report produced by the participant and an observation I made at the same time. This inconsistency prompted me to enquire about the topic. Frank records his solar power generation in what he refers to as is “little book”. Frank introduced this method of tracking generation to me when I enquired if he has a monitoring device for his electricity use (Line 77). Frank told me he had a device and then he proceeded to get up from his seat and obtain the device for me to view. Frank made the following comment as I was looking at the device:

Transcript 1 – In-home (Lines 86 - 97)

Frank: Quite often. Like at the moment our usage at the moment is probably about I’d say two to three hundred [2.5] watts that would be about all but as you see now its registering two point four which is in my favour because of the solar. So at the moment we’re currently making two point four kilowatt hours. Or kilowatts per hour
Andrew: Does it- does it subtract the difference
Frank: [no]
Andrew: [so] if you're using three hundred and you’re making say twenty seven
Frank: but I can tell you what they are cause I read them every night and it tells me what I’ve used for the day and what I’ve actually made for the day
Andrew: ok, and you record that?
Frank: I record that in my little book

Frank’s monitor is an Efergy Elite model and as per the model specifications, it does not distinguish between solar generation and electricity use\(^\text{14}\). Meaning, if the household is using 500 Watts and generating 1500 Watts, it will display 2000 Watts not 1000 Watts. This means that anyone who has solar panels installed cannot use this particular device to accurately measure their generation and consumption separately. I was curious how Frank knew he was generating 2400 Watts of electricity so I asked him if the device subtracts the solar generation from the electricity use (Line 90). I knew

\(^{14}\text{Based on the model’s manual:}\)

the answer to this question; however, I was probing Frank to explain his reasoning behind his measure of generation. He answered “no” (Line 91) and I proposed a scenario that Frank addressed by revealing his method for measuring his solar generation (Lines 94-95). I then enquired in line 96 if Frank records his generation data. This is the point in which Frank introduces his “Little Book” in line 97.

Frank presented the “Little Book” to me which I examined. Two pages from the book can be seen below. Each page in the book is split into six columns with the second three columns being continuations from the first three. The columns are arranged as date, total accumulated energy use, total accumulated energy generation. The superscript numbers are the difference between the previous day and the current day’s reading. The superscript difference gives the daily energy use and also the daily energy generation for the household.

![Figure 4.1.1.1 – Energy Generation Record Book printed with permission](image)

As Frank showed me this book, he described how he uses it in the following excerpt:

**Transcript 1 In-home (Lines 104-108)**

Frank: That's what we've used *points to column*, and that's what we’ve made *points to column* so if you go through there on the usage, our average usage is probably around six to seven kilowatt hours and the average varies depending on the day but probably I’d say what would we have twelve to fourteen kilowatt hours per day some days are eighteen some days are six but probably across the board I’d have to work that out, I haven’t actually worked that out.
The above excerpt shows how Frank explains his understanding of his electricity use combined with his solar generation. Frank is able to identify his average daily energy use which he describes as “probably around six to seven kilowatt hours”. Also, he is able to identify his daily solar generation which he describes as “twelve to fourteen kilowatt hours per day”. Frank even identifies from his book that there is some variance in his generation by stating “some days are eighteen some days are six” (Kilowatt Hours).

Frank’s book is a method he has developed to keep track of his electricity use and solar generation. This “Little Book” method picks up where the existing technology falls short. After viewing this book and seeing the consistency in daily readings throughout, it is apparent that electricity use information that incorporates the solar generation is important to Frank.

From a methodological viewpoint, the observation of this “Little Book” is very important for this research. The sequence that led to the book being introduced started with Frank stating his use as “probably about I’d say two to three hundred [2.5] watts”. I identified that this is different to what the electricity monitor I was holding said on its display. Therefore I encouraged him to elaborate on his comment by stating “Does it- does it subtract the difference” which proposed a lack of understanding between what was said by Frank and what was observed by me. At that point Frank then attended to my query by stating that he knew what his electricity use actually was because he “read[s] them every night” (inferring his electricity use and generation). I asked if he recorded his use, and he presented to me his “Little Book” that he uses to record his observations. The ability to discover this book, through identifying an inconsistency through was said by Frank and what was observed, demonstrates that in this instance being face-to-face in the participants’ home provided an opportunity for the researcher to attend to an instance that provided new data. This particular instance may be more difficult over the telephone.

Throughout this research there were two instances of participant’s using their own methods to create electricity use tracking systems. Frank’s method (in-home data) of tracking and Jen’s method (telephone data) of tracking her use introduced in the telephone data. Both of these methods were introduced during the same question: 24. Do you have monitoring devices for your electricity use? Both instances involved the telling of a narrative. However, only Frank’s interview afforded the introduction of a visual element which allowed clarification and confirmation of the story. Jen’s interview was over the telephone, therefore probing for further information to ensure consistency and accuracy throughout her narrative was limited to self-reported behaviour.
4.1.2 Ability to Confirm Interview Reports

The second instance involved observing the placement of the energy monitor in a common area (the kitchen). This instance allowed me to confirm previous information provided by the participant in the interview portion of the in-home visit. The interview excerpt can be seen below:

**Transcript 3 – Phase two in-home (Lines 83-91)**

Andrew: Do you have monitoring devices for your use?
Janice: Yeah we umm we got the umm oh what was that called the one through the- you paid fifty dollars and the person came to your house
Andrew: climate smart home service
Janice: climate smart that one yeah we got that done so we’ve got one of the monitoring devices from them umm which tells us yeah roughly where we’re at during the day so
Andrew: How often do you think you use it
Janice: look it sits in the kitchen on the bench so I guess when you’re in the kitchen and you’re doing things I’ll quite often just have a look and see where we’re sitting

During this interview, Janice mentions that she has a monitoring device and it resides on her kitchen bench. At this stage of the interview, similar to the telephone interviews, there was no way of confirming if what she reported an actual or a favourable response. This report from Janice is similar to the telephone report from Kate in the below excerpt:

**Transcript 1 – Phase one telephone (Lines 133-138)**

Andrew: ok and you said you have a monitoring device um for your u- uh for your electricity use, how often do you use it? Does it just sit there and and sort of [live in the background]
Kate: [I’ll I’ll look at it] um look at it pretty frequently cause its right in our kitchen in a very visible spot, so you see it multiple times a day and keep keeping an eye on it just to sort of see if there is anything I forgot to switch off

Both Janice and Kate claim to have an energy monitor in their kitchen which they use on a regular basis. However, at this stage of both interviews I, as a researcher, can neither confirm or deny if what they are telling me is accurate. The one difference is that when I conduct the in-home walk through with Janice, I am able to confirm through first-hand observation that she does have her device in her kitchen, and is viewable from the main area (Picture one). Also, the device had no dust on it (Picture two) and was free of clutter within its immediate proximity. This may indicate that it is used often and required to be within view from various angles within the kitchen. Janice allowed me to take a picture of her monitor that can be seen below. The layout of the bench tops was untouched from when we entered the room until the photo was taken; therefore this layout is in as natural a state as I was able to capture it.
This example is not intending to claim that people are untruthful during interviews: It is illustrating that visual data can be used to confirm the reported information provided during an interview. This opportunity was not available to telephone only interviews.

The same method of scenario creation and stages of mastery that were used for the telephone data was used in the in-home data. The following sections comprise the two scenarios from the initial telephone chapter and incorporate the in-home persona of Sam. The next section sees Sam’s projected stages of mastery described.

4.2 Scenario 1 – Using the system to examine energy use

Sam is busy preparing a large catering order for a client’s afternoon tea the next day. Since installing solar panels, she is conscious of her energy use and generation and tries to monitor both regularly. Sam has to whip a significant amount of cream which will probably take her about three hours of running two electric mixers. She quickly looks at her device from the kitchen and sees the screensaver upshot which compares solar generation to her current use. Sam sees that her generation is lower than her use right now which means she has an electricity deficit. Based on this information, Sam decides to whip the cream later in the evening in order to maximise her solar gains throughout the day. The result of this choice will be a larger rebate from her energy company when her next bill arrives.
Figure 4.2.1 – Sam Scenario 1

Sam’s scenario highlights some possible design choices for the Gamified system. These are aesthetics, a screen saver upshot, and the solar generation and electricity use comparison. The aesthetics are introduced due to Sam’s placement of the device. Sam works from home – in the kitchen. She uses a lot power and wants to keep a regular eye on her use and generation. Therefore, the most logical place for this device is in the kitchen (as the picture in the persona illustrates). This suggests that the aesthetic of both the hardware and interface must pleasant.

The screen saver upshot was decided upon because Sam works with food. She is busy and wants to keep an eye on her electricity use and generation. It is probably unfeasible for her to constantly wash her hands while working just to check her generation and use. Therefore a solution to that would be to have a quick upshot of power generation and use visible without needing to touch the device.

Finally, Sam wants to understand her overall electricity situation by incorporating generation and use. This is illustrated by incorporating the picture of the “little book” into Sam’s persona as a method used to achieve this level of understanding. Therefore, a mechanism designed into this
device which allows power generation and power use to be compared would satisfy Sam’s desire to
distinguish between the two.

4.3 Scenario 2 – Challenging another user to an energy saving competition

Sam taps on the “Challenge” button then on “Find a Challenger” and is paired with someone quite
quickly. Since Sam works from home, she finds she is unable to conserve significant amounts of
energy in the kitchen as she must operate appliances. Also, Sam looks for a way in which her solar
generation will help her with her competition. She re-reads the rules and finds that for every
kilowatt hour generated from solar, one kilowatt hour of use is cancelled out. Sam is pleased to find
that generation will count similar to conservation. This means she can maintain her business
operations and still have a chance in the competition.

![Image of hand-written notes]

Figure 4.2.2 – Sam Scenario 2

Since Sam works from home, she uses a lot of electricity. This is stated in the above scenario to
situate the actions. Her inability to conserve significant amounts of energy due to her working life is
challenged by her design to win the competition. Therefore, wanting to compete and track her
energy use she looks for a way to capitalise on her generation. This allows the design idea of
generation being used to offset use as a form of conservation. This stems from Sam’s need to
distinguish between electricity use and solar generation and also her need to use large amounts of energy daily. Therefore the concept of including a generation offset mechanic was introduced as a potential solution in the above scenario.

4.4 Stages of Mastery

Novice

Sam already has a device to help monitor her electricity use. She also keeps a manual record of her use. (Both of these can be seen on page two of Sam’s persona). Sam hopes that this new system will be able to make her tracking easier and distinguish between her generation and use.

This stage incorporates two of Sam’s needs: easier energy tracking and a system that distinguishes between solar generation and electricity use. Also it introduces her existing methods of tracking and infers that the transition period is approaching.

Problem Solver

Sam looks at the system regularly and has begun to experiment with load shifting. This allows her to monitor her use relative to appliances. Sam has increased her generation amount by 5% due to load shifting.

Sam is exploring both the system to make her energy tracking easier, and how load shifting may benefit her energy use. This is an affordance that the system helps her understand by providing real-time feedback when an action has been undertaken.

Expert

Sam now knows which times of the day are the highest for her generation. She has been able to adapt her cooking schedule to this knowledge which allows her to generate more money during peak times. This has seen an increase in her electricity generation rebates.

This stage demonstrates that Sam has acquired a body of knowledge about load shifting. This is reflected in her behaviour which involves shifting certain activities around in order to maximise conservation behaviours.

Master - Has system as part of their identity

Whenever Sam takes on a new contract, she plans out activities that use high energy appliances to be undertaken during off-peak hours. Sam also actively competes in competitions during the days because she knows that her solar generation counts for a significant amount of her saving.
This stage demonstrates forward planning by Sam which was achieved by making her energy tracking easier to understand. She plans activities from a financial perspective in order to maximise energy rebates.

**Visionary**

*Sam users her screen saver upshot almost on an hourly basis. She finds this style of tracking very quick and easy. She would like to see some appliance level monitoring integrated into the device. This way she will not need to do the math in her head to work out how much power a specific device uses.*

Sam’s need to make energy tracking easier stems the basis for her appliance level monitoring idea. Being a tracker who wants to make that task easier, she is searching for how to improve an already good process. This involves introducing new elements that may streamline already current system design.

**4.5 Conclusion**

There was no remarkable difference in questions asked in the interview portion of the in-home phase and the telephone phase. The telephone interviews provided enough information to develop several personas to focus the efforts of the design team. The added benefit of the in-home research allowed the inclusion of real-life visual artefacts in the created persona.

The areas of interest discovered in the in-home data are based on the ability to make visual observations in the participant’s homes. Undertaking interviews over the telephone does not afford the ability to make real-time visual observations of naturalistic environments.

The ability to identify an inconsistency between what was reported and what was observed allowed the introduction of a new relevant artefact to the interview. This artefact was used as a point of conversation around tracking electricity use and generation. This is a rich find that allows the design team to not just visualise methods used, but they can observe a working example.

The ability to confirm reports of behaviour is another affordance of being in the participant’s home. Over the telephone, the interviewer generally has to trust that the participant is telling the truth and hopefully recalling their experience correctly. Whereas in the participants home, there was an opportunity to empirically confirm the interview report with visual observation.

The use of space and objects to introduce interview material was identified in this research as an affordance of being in the participant’s home. Via the telephone, it is difficult to gather an accurate understanding of the arrangement of physical elements within spaces. Whereas being in the
participant’s home, this information can be gathered quickly. The information was able to be introduced in the interview to probe for further information.

The creation of the persona Sam demonstrates what additional player focused Gamification architecture elements can be derived from in-home ethnographic data. The incorporation of visual artefacts into the persona is taking a step further from just including text-based information for designers. This inclusion of the visual elements present in the in-home visits was an affordance not made possible in the telephone interviews.
5 – Summary and Conclusion

This section concludes the dissertation by first revisiting the main research focus in the form of a narrative of the process and how it was achieved. Second it addresses and answers the two research questions proposed in Chapter One. Third, the chapter discusses the activity of doing ethnography to inform the Player Focus section of a Gamification design architecture. Fourth, it addresses methodological reflections, and then finally the chapter addresses limitations and further research.

This research began with an idea to build an interactive device to monitor real-time domestic energy use. This idea was pitched to the Queensland Government and it received a Government grant to put towards business costs to develop this idea into an actual device. The design process started off with literature being read on domestic energy conservation and in particular behaviour modification for domestic energy conservation (section 1.1). This research found that there were two categories of intervention type which research focused their studies around; antecedent and consequence. Antecedent aims to influence underlying determinants before energy use action takes place and consequence interventions aim to engage the participant after the action, in the hope that future action will change.

Modern technology is using certain elements of these research categories by operationalising them in interactive systems to encourage domestic electricity conservation (section 1.1.2). These are known as in home devices or IHD’s. IHD’s take real-time electricity use and display it to the consumer. Some IHD’s have just the display; others have specific elements such as historical use, goal setting, and average use. There is a new area of technology called Gamification, introduced in section 1.2, which takes the addictive elements of games and uses them in non-game contexts. This provides a new area to explore for both research and business in the realm of domestic electricity conservation. This is where the concept of designing a gamified system for domestic electricity conservation came from. Now, the challenge was to build such a system.

After narrowing down the concept of ‘just an interactive system’ for domestic energy conservation to a ‘gamified system’ I was able to start looking at the Gamification literature. I explored previous literature on games in energy conservation, and I found that research has looked at using entire virtual games (similar to The Sims videogame) to encourage domestic energy conservation. These games focused significantly on creating a virtual world for the users to immerse themselves in, which, in a way, removes the user from the actual practise of energy conservation. The goal was education and hoping to teach conservation habits in the game so they will be replicated in real life. The research was successful, with some savings being noted, but it seemed like an awful lot of work to encourage people to conserve electricity. I then found that Gamification doesn’t mean creating a
game for the activity, it is focused on creating a game from the activity. This is important, because creating a game for the activity involves focusing around a separate game designed from the activity that the behaviour change is intended for. Whereas creating a game around the activity to change behaviour makes the activity central to the game elements.

What I found when reading about Gamification is that the field itself is in its infancy. Text books such as Zichermann and Cunningham (2012) and Dougann and Shoup (2013) introduced various concepts and idea with minimal structural frameworks around these concepts. Zichermann has, what he calls, a Gamification architecture template (section 1.3.1 and the full template is in Appendix A) that he uses to teach other practitioners in his Gamification certification workshops. This architecture lists the relevant areas that Zichermann argues need to be addressed in a gamified design, but little more is done that just listing them. From the perspective of a novice, this was very confusing and difficult to understand.

In order to understand how this architecture could inform design of a gamified system I arranged the list of areas into three groups which I labelled Player Focus, System Focus, and Activity Focus. The Player Focus, explored in-depth in section 1.3.3.1 is concerned with understanding player types, player stories, and stages of mastery. The System Focus incorporates the system objectives, key metrics, and integration with technology. The Activity Focus comprises elements, mechanics, game dynamics, and social reinforcement. This helped me to understand the architecture and move it from a list that was unordered and jumping from topic to topic into a more focused blueprint to begin constructing a system.

Now I had the blueprint, I had to start filling it in. Gamification literature suggests that the Activity Focus is dependent on the Player Focus and the Player Focus is determined by the player type. This is argued by Zichermann and Cunningham (2011 p. 15) who state “The player is at the root of Gamification” and reinforced by Dougan and Shoup (2013 p. 23) who posit “understanding player motivation is key to designing a successful Gamification system”.

The player types used in Gamification are modelled after Bartle’s Player Types (1996) of Killer, Achiever, Socialiser, and Explorer. Gamification argues that different player types will prefer different activities. For example, an explorer will probably not be interested in engaging another player in a competitive manner. The explorer wills most likely want to explore every aspect of the system and develop an in-depth understand. Therefore the Activity Focus should be designed to address the needs of the intended Player Focus.
This means that in order to design a Gamified system, an in-depth understanding of the intended players would be required. Therefore I began researching how to achieve this level of understanding of the intended players. The standardised way to identify if someone is a certain player type is to have them undertake the Bartle test, which asks a series of questions to identify which of the above four category of player the person is most like. What I found though, was by pre-determining four categories for people to fit into by taking the Bartle test will find that everyone that takes the Bartle test will fit into one of those four categories. There is nothing wrong with this method; in fact, it is the preferred method of the industry leader Gabe Zichermann and other Gamification practitioners. However, I felt the idea that Gamification designers proposes to understand the player and design specifically for them by forcing them into one of four categories was counter-intuitive. That is, the Gamification designers are not understanding a player per se, they are categorising them based on pre-determined categories. In order to truly understand the player another way of achieving the Player Focus was needed.

This proved a turning point in my research, as now I was not so focused on creating a gamified system, I was focused on understanding the methods by which creating the system is achieved. To a finer point, the methods by which the Player Focus is achieved. This provided a shift in the literature from a design and development focus to a methodological focus. This is what led me to turn towards Ethnomethodology (EM) (explored in section 1.4.2) because EM is as much concerned with the methods of people being studied as it is with the researcher’s methods. EM’s history of looking at the methods of analysts as much as the methods of people proves it was a good fit for framing this research.

Therefore I decided to invert the thinking of using the methods of achieving the player focus section of a Gamification architecture with ethnographic methods as a resource. Rather, these methods were treated as a topic of enquiry for this research. This is in line with EM’s programme, introduced in section 1.4.2.2, of respecifying common methods as resources for analysis and treating them as topics of enquiry in and of themselves.

So, in order to study this as a topic of enquiry, I needed to undertake the activity that is doing ethnography for designing the Player Focus of a Gamification architecture. Returning to the architecture, I now had to begin with the player focus. In order to understand the activity to create a game around, I had to first understand the intended users. The push to understand the play in Gamification is remarkably similar to the philosophy of User-Centred Design (UCD), introduced in Chapter 1, which places the users (players) at the centre of the design decisions.
One fundamental way in which UCD achieves this user focus is through the use of personas and scenarios (described in section 1.4.3.2). Personas are rich descriptions of typical users of the product under development that the designers can focus on and design for (Sharp et al., 2007). Personas are normally created from ethnographic data of intended users of the system or product. Scenarios are the output of operationalising the persona by imagining it using the system to achieve a goal (Cooper, 2004). The most common scenario in design work is the walkthrough scenario (Pruitt and Adlin, 2010).

I began reading into the literature about personas, scenarios, and Gamification. The idea was to find a way to replace the existing Gamification architecture elements of player type and player stories with the UCD elements of personas and scenarios. However I encountered a gap in the literature. It turned out that these UCD methods are largely glossed over in the academic and industry literature. For example, the transition from ethnographic research and analysis to creating personas is underexplored. This is most likely due to the taken-for-granted nature of the researchers just using these methods as a resource for design. Therefore, in an ethnomethodological vein, I aimed to expose these methods as a topic of interest for research. This led me to the overall focus of this research of analysing how ethnographic methods can inform the design of a gamified system for domestic energy conservation.

Placing the user/player at the centre of the design is the argument of both Gamification and UCD. However, each paradigm travels a different path to get there. Gamification uses a top-down survey approach to understand players by categorising them. Whereas UCD uses a bottom-up inductive approach to let the player’s categories emerge from the data. There is an argument by Dixon (2011) who posits that personas should replace Player Types. Dixon argues player types are (at this stage) not a defined concept and personas are a useful tool to put ethnographic research into practice as part of a gamified system. Therefore I decided to take the UCD approach of incorporating personas and scenarios in the Player Focus section of the Gamification architecture.

Since personas and scenarios are based on user information I had to find out how to best represent the user. I found that ethnographic methods have been used as a way in which a rich description of the user could be achieved in interaction design. This area, known as Design Ethnography (Crabtree et al., 2012; Hughes et al., 1995; Millen, 2000) or “quick and dirty ethnography” (Hughes et al., 1995, p. 6; Crabtree et al., 2012) is concerned with generating an understanding of the intended users of a system as well as the environment. Therefore, I found that ethnographic methods would be a good choice to gather user information to inform the Player Focus.
5.1 Doing Ethnography to Inform the Player Focus

As the literature review argues the majority of design related research implements design methods without spending much time detailing the specifics of each method. This makes it hard for a novice designer and a novice researcher, such as myself, to understand these methods and how they can be applied in a new setting (Gamification). Therefore, this dissertation contributes to the literature by describing and exploring the figurative ‘arrows between the boxes’ that are present in current Gamification design research. That is, essentially exploring the question of “what does it mean to transition from user data to a persona or player story and then to scenarios and stages of mastery?” Prior research attempts to explicate the steps taken to create personas based on ethnographic data, however, prior research underexplores the specific methods used to transition between sections. For example the below image from Jacobs et al. (2008) denote specific methods with labelled boxes and arrows to indicate a movement path.

![Diagram ofPersona and Scenario Creation Example 3](image)

Figure 5.1.1 - Persona and Scenario Creation Example 3

These diagrammatic instructions represent established concepts in the area of interaction design, but, for a novice research, the specific actions are unclear and leave a lot of room for speculation. For example the instruction “Identification first user group” (Jacobs et al., 2008) is unclear in terms of how one should go about creating these ideas. Also, there is no explanation of what constitutes the arrows between sections. Indicating an unknown area of what happens between these sections.
This research attends to this gap by describing the methods and reasoning behind the creation of specific personas based on ethnographic data. The description, or operationalisation, of this process fills in the underexplored process between concept and creation of personas, scenarios, and stages of mastery in a gamified system (Zichermann and Cunningham, 2013; Duggan and Shoup, 2013).

This dissertation provides a research step towards de-mystifying the above gloss of arrows and boxes in Gamification research by explicating the methods used to develop the Player Focus section of a Gamification architecture. This was achieved by identifying what a glossed version of doing this ethnographic research for designing the player focus section of a Gamification architecture would look like. The following diagram represents this gloss with the specific areas of enquiry circled in red:

![Glossed Gamification Diagram](image)

Figure 5.1.2 – Glossed Gamification Diagram

This dissertation described the activities necessary to achieve ethnography for Gamification design by providing insight into what methods were undertaken to achieve the arrows and bubbles in the above diagram. This research builds on previous literature, introduced in Chapter One, which addresses a combination of the existing view of ethnography and ethnomethodology’s design contribution (Dourish and Button, 1998; Ikeya et al., 2002; Crabtree et al., 2012); the use of personas and scenarios to represent users and their expected actions (Cooper, 2004); the current methods to develop the Player Focus section of a Gamification architecture (Zichermann and Cunningham, 2013; Duggan and Shoup, 2013); and the clarification of Gamification Player Focus concepts by incorporating scenarios (Dixon, 2011).

This dissertation detailed, in the analysis chapters Three and Four, the explicit methodical steps taken to gather empirical player focused data using ethnographic methods and then generate the Player Focus elements for the purpose of Gamification design. Interaction design literature discussed in Chapter One states that common ways of gathering ethnographic data are through the use of interviews and observation (Sharp et al., 2007). Therefore, this led to these two research questions being developed to address the overall research focus:

1. What player focused Gamification architecture elements can be derived from telephone data?
2. What additional player focused Gamification architecture elements can be derived from in-home data?

This saw two separate research phases created to address each of the above research questions. The first phase comprised interviewing participants over the telephone. The second phase involved actually going to the participant’s homes and conducting the interview in their home face-to-face and also walking around their home with them to discuss both energy and technology use.

5.1.1 Constrained themes and Interactional Phenomena

The standard method to develop a player understanding for Gamification design is the Bartle player types– introduced in the literature review in chapter one. The Bartle player types propose a rigid set of constrained categories in which to place intended players to create design elements or design hooks. This thesis explores the nature of the intended player as more than a set of rigid categories with which to design. This work refocuses the top-down thematic categorisation of players and replaces it with a bottom-up style which does not limit the inclusion of observed omnipresent social interaction that can be excluded from the traditional Bartle player types. The point of difference between these interaction-centred design elements and the traditional Gamification design elements is the inclusion of omnipresent interactions that construct everyday life as the basis for design choices. This dissertation concludes that by including an ethnographic component in gathering player information, detailed personas can be created from interactional phenomena between the user and designer.

5.1.2 Interaction-Centred design

This dissertation explored and described the methods used to achieve interaction-centred design for the purpose of designing the player focus section of a Gamification architecture. The main point of difference in this type of design is it focuses on interactional social practices and how those practices are demonstrated during the ethnographic research. These phenomena are everyday accountable actions, which, when focused in a design capacity, provide insight into the behaviours of intended users.

This builds on Dourish and Button’s (1998), Ikeya et al.’s (2002), and Crabtree et al.’s (2012) work, introduced in chapter one, concerned with the use of ethnomethodology in design work by looking methodically at behaviours to understand where design can compliment. Looking at the everyday behaviours of participants demonstrated in the methods used to achieve doing interaction-centred design allows the creation of design elements or design hooks to be grounded in empirical data.
This research has identified phenomena that are reflexive of the complex social world, that is, the phenomena and description cannot be separate from each other. Therefore, Gamification should move past thinking of people and elements strictly in terms of a game and game design. The use of personas, scenarios, and stages of mastery as presented in this dissertation moves beyond the rigid frame of the traditional Player Focus elements and incorporates broader social world artefacts, such as pursuing information and seeking clarification, into the design process.

5.2 Research Question One

1. How are Player Focus Gamification architecture elements derived from telephone data?

The Player Focus elements were derived by focusing on the principle of interaction between designer and user as the basis for focusing the design choices. This Interaction-Centred Design moved past the constrained theme, or category, of player and user, and adopted the broader view of how the social world is enacted methodically and moment to moment in phenomena which are omnipresent as a part of doing everyday life.

The interactive nature of the interview produced three personas that are all very different, and each of them provides sufficient information to create design choices. This is different from the traditional Bartle player types introduced in section 1.3.3.1 of this dissertation as it uses a ground up principle to build personas from ethnographic data, rather than a top-down approach of placing players into pre-determined categories.

The process used to develop the player focus section of the Gamification architecture can be summarised in two main parts: Ethnographic research and construction of the Player Focus.

The ethnographic research involved undertaking 10 telephone interviews and transcribing the data for analysis. The analysis was ethnomethodologically focused, meaning it was concerned with the sequence and structure of the interview to reveal phenomena. The phenomena were then grouped into categories in order to move to the Player Focus section.

The Player Focus section involved the construction of personas, scenarios, and stages of mastery. The phenomena from the ethnographic research were operationalised into the “Background” and “Needs” sections of the personas with details such as name and demographic information created to give the persona a real-life feeling. The next step involved identifying regular actions of the finished system to create scenarios for the personas to be envisioned in those scenarios. This process involved laying out the personas and the scenarios on a modified “Video Analysis Wall” (Schuler and Namioka, 1993 p. 149) in order to construct a collage of idea, issues, and design opportunities. The next step was to translate the information from the wall into a narrative for each persona and
scenario combination. The final step was to use the personas as focus for constructing the stages of mastery. The stages of mastery used the Ethnomethodological notion of accountability to develop the five stages of mastery for each persona. Each stage was crafted with the description of specific accounts that that persona would produce which makes that stage recognisably so.

A summary of the steps undertaken to produce the Player Focus section of the Gamification architecture from the telephone data have been outlined below:

- Ethnographic Research
  - Conduct telephone interviews and transcribe
  - Ethnomethodologically focused analysis
  - Identify phenomena

- Player Focus
  - Group relevant phenomena and construct personas
  - Identify regular actions as scenarios
  - Construct a persona narrative
  - Identify persona based stages of mastery
  - Use the EM notion of accounts to develop stages of mastery

This research found that in regards to research question one the data obtained via the telephone provided sufficient detail to construct three separate personas. This research used personas in the place of Gamification Player Types which aligns with the Dixon (2011) who argues that personas should replace Player Types.

These personas were developed from the ethnomethodologically focused analysis of ethnographic data. The development of scenarios was used to inform the Player Stories/Scenarios section of the architecture. These scenarios were focused around exemplifying behavioural traits from the scenarios in specific user activity settings. Finally the Stages of Mastery section was created through the use of personas by providing representations of the specific personas throughout their mastery progression in the system.

The telephone interviews provided empirical grounding for the design of the personas by analysing what the participants did from a methodical view of looking into the practises demonstrated in answering questions. The richness in the data is not primarily concerned with the content of the telephone data; moreover it is the methods demonstrated by participants when answering questions.

The telephone data was analysed at a structural level looking at how people answer questions and their own methods of making sense of the situated interview. The findings of this analysis were then
transformed into personas to represent the participants. The process of transforming this ethnographic information from data to the useable design elements of personas, scenarios, and stages of mastery has been exposed in chapter three.

The findings for the telephone data chapter were that analysing the way in which people respond to telephone based interview questions produced three design personas: Anna – The Bottom Liner, James – The Clarification Seeker, and Graham – The Explorer. Each of these personas encompass concepts in the data that participants demonstrate which make them recognisably so. These personas were then used as a design artefact to represent the players in the creation of scenarios and stages of mastery.

5.3 Research Question Two

2. How are additional Player Focus Gamification architecture elements derived from in-home data?

The additional Player Focus elements were derived by focusing on the principle of the ability for the designer to incorporate visual observations into the interview process. This interaction with the environment afforded new data to be introduced thereby providing empirical evidence to base the creation of design elements in sections 4.1.1 and 4.1.2.

The main difference in the in-home phase was the ability to incorporate visual observations as interactional data during the in-home visit. The addition elements derived from the in-home data were the “Artefacts” section of the in-home data based persona (see Figure 5.3).
The design artefacts provide empirical evidence and examples of persona traits exemplified in the interview portion of the phase. These elements were chosen for their relevance to the case study which frames this research. That is, they are accountable artefacts concerned with domestic electricity conservation behaviours.

Research question two focused on the additional elements that being in the participants’ home offers. These elements comprised what the interviewer could achieve by being in the participant’s home. Essentially, identifying what could be added to the interviewer’s practises in order to further inform design.

The in-home phase didn’t just add ‘more’ information to the project; it changed the perspective of what the ‘more’ is and what the interviewer can do, which is different from what can be found out from an interviewee. In that regard, the more detail I found was about what I could get in terms of information. It was the ability to look for or to find new data to introduce, or to confirm reports. The actions are not participant actions, they are researcher initiated actions which would be difficult to replicate via the telephone.

The in-home data were also analysed at a structural level similar to the telephone data. The key difference in these data was the ability to, as a researcher, introduce visual information during the interview process. The addition of visual data was an affordance that being in the participant’s home allowed, whereas, via the telephone this may not have been possible. The in-home interviews produced a fourth persona Sam – The Tracker who represents the visual data introduced during the in-home phase. The explicit steps taken to turn the in-home data into useable design elements of a persona, scenarios, and stages of mastery has been exposed in chapter four of this dissertation.

5.4 Contributions
The contribution this research provides to the Gamification design community is firstly by demonstrating the place that interaction has in the design process. This research found that the glossed areas, or arrows, in the design process are actually made up of interaction-based activities between designers and users.

Second, the research explicated the process of incorporating ethnographic methods into Gamification design work. Ethnography in the interaction design is not a new area as the reviewed literature demonstrates. Also, the specific design tools of personas, scenarios, and stages of mastery (described in section 1.4.3.2) are also not new areas of research. The contribution lies in the
description of the accountable actions demonstrated to achieve these design tools and their transition into a Player Focus section of the Gamification architecture.

5.5 Methodological Reflections

Undertaking the two phases of telephone and in-home produced several points of comparison which will be discussed briefly. These are the efficiency, cost, participation, access, and quality.

The telephone phase was far more efficient than the in-home phase. Upon contacting participants, most of them agreed to undertake the interview right there and then on the telephone. The interviews lasted an average of 15 minutes. Recording software on the telephone was used to record the interview. The in-home phase required phone calls and emails to setup the in-home visit. The actual visit lasted an average of two hours and was limited to one per day. Recording the visit included using a digital audio recorder, video camera, still digital camera, and my telephone recorder for backup. Gathering data via the in-home method for the purpose of this research was inefficient when compared to the telephone.

The telephone phase was relatively cost efficient compared to the in-home phase. The recording software on the telephone which cost less than five dollars was used to record the interview. Whereas, unless supplied, sound recorders, video cameras, and a digital still camera can be expensive. The telephone participation did not require a reward as it was only a small amount of time and little inconvenience whereas the in-home phase needed a $50 voucher to encourage participation. This was due to disruption of participants’ daily life, the time taken to conduct the research, and the invasiveness. Overall, the cost of the telephone phase was significantly less than that of the in-home phase.

There were no participation issues in the telephone phase of the research. Every participant who agreed to the interview undertook the interview at the scheduled time. Some of the participants were happy to conduct the interview on the initial phone call. As mentioned in the limitations section, two participants withdrew from the in-home phase. The telephone provided the highest level of participation with everyone agreeing to undertake that phase of the research.

The telephone interviews did not require much negotiation as the participants were happy to give up about half an hour of their time to undertake an interview. No access was required to the participants’ home and minimal negotiation was required to find a mutual time to conduct the interview.

The in-home phase required significant negotiation. Negotiating access to participants’ homes in the evening when it is quite busy was challenging. Also, the recording of visual data with a video
camera and digital camera took some negotiation with the participants. For example, recording rooms of people's house and taking photographs of various aspects of their house. Agreement was finally reached with the participants by negotiating which sections were deemed filmable and which were not. Recording devices were used to capture information to minimise invasiveness and disruption (Bengry-Howell & Griffin 2012).

The main difference between the telephone data and the in-home data is the inclusion of interviewer achieved visual data. During the in-home visits the use of visual observation of the interviewer allowed the introduction of new data, the ability to confirm reports, and the observation of space and objects.

Overall, for the purpose of this research, the telephone phase provided enough ethnographic information to successfully inform the design of a gamified architecture for domestic electricity conservation. The in-home phase was less efficient, more costly, harder to recruit for, and difficult to negotiate access. However, the in-home phase did produce another persona, with the added benefit of a visual section to the persona. Therefore, this indicates that making the most out of the face-to-face time with participants in their home is important. This would include involving the participant in some interactive activities such as paper prototyping and field trials. Having the system design further developed, possible to a wireframe or prototype stage would have been of greater benefit for this research. The in-home phase of the research delivered little benefit to the Gamification architecture compared to the telephone phase.

5.6 Limitations

The main limitation is the use of a convenience sampling for recruiting. This technique was used to overcome time and monetary constraints. Marshall (1996) argues, this method is not as rigorous as other qualitative sampling methods such as judgement sampling or theoretical sampling. However, for the purpose of this research, the data provided via this method was suitable to undertake the methodological research.

Two participants withdrew from the in-home phase of the research. The first participant chose to withdraw during the informed consent phase of the visit. The participant stated they ‘did not feel comfortable having their home put on show’. The second participant withdrew at the same point as the first – during the informed consent phase. This participant stated that the invasiveness of the walk-around in the home was too much for the money offered. Other than these two instances, no other participants withdrew from the research.
The analysis of my own methods was based on lived experience and recorded notes. Whereas a truly objective way would be to video record myself undertaking the entire process from start to finish of the duration of this research and ethnomethodological analyse the video data.

Another limitation present in the assessment of semi-structured interviews is the issue of question construction. The different formulation of the question to the participant may seed different responses to the question. Consider the below examples:

**Transcript 2 Line 121 - 122**  
Andrew: ok what is the difference between a kilowatt and a kilowatt hour  
Jen: umm I’m not too sure sorry

**Transcript 4 Line 108 - 110**  
Andrew: fair enough alright do you know the difference between a kilowatt and a kilowatt hour  
Phil: no not a clue hehe

**Transcript 8 Line 146 - 151**  
Andrew: alright so I’m just going to ask you a question now what is the difference between a kilowatt and a kilowatt hour  
Bec: ummm I don’t know  
Andrew: dun[no]  
Bec: [no]t sure no

In transcript 2 above I asked “what is the difference” and in transcript 4 above I asked “do you know the difference”. These different seeding questions may impact the nature of the answer provided by the participant. Asking “what is the difference” is formulating the question in such a way that the participant should know the answer. Whereas “do you know the difference” is asking the same question in a less confronting probing style. This demonstrates that the answer is not separate from the question.

The nature of semi-structured interviews is that the question structure can in fact change from one participant to the next. As Sharp et al. (2007, p 299) posit “for consistency the interviewer has a basic script for guidance, so that the same topics are covered with each interviewee. The interviewer starts with pre-planned questions and then probes the interview to say more.” From a top-down perspective using Bartle’s player types, this would be problematic, because deviation from the prev-validated questions will provide invalid results as an outlier.
However, from the bottom-up inductive method, deviation from the script, or as this dissertation uncovered, variance in the seed question actually provides space for previously uncovered phenomena to be observed-and-reportable. This ‘limitation’ actually illustrates the value of the interaction-centred design in not limiting the scope of data collected by imposing pre-determined constraints. After all, design is a largely creative endeavour and by dismissing a potential source of data and knowledge would be to limit the efficacy of the designer and user interaction.

5.7 Further Research

This research demonstrates that the boxes and arrows in many research methods sections are glossing over the explicit methods. There are lots of quality design choices to consider when it comes from conceptualising what the correct path is when faced with an ‘arrow’ in a design framework visualisation. This research does not propose a final version of those methods, however it does contribute to the literature by documenting what comprised the ‘arrows’ in this case study. Therefore, future research may look at explicating the process even more, and developing some design principles for novice designers to understand and implement.

The use of ethnographic data to inform design of the Player Focus section of a Gamification architecture was analysed in this research. Understanding the framework as a whole and exploring other areas of the System Focus and Activity Focus where ethnographic research may contribute is another direction for further work.

Also, on a quantitative front, building on this work and the already established work of using games for energy conservation (Bang et al. 2006, 2007, 2009; Geelen et al. 2012; Gustafsson et al. 2009, 2010; Madeira et al. 2011; Reeves et al., 2012); designing an empirical study to test the effectiveness of Gamification on behavioural modification for conservation behaviour would be another area for future research.

On a personal note, this research will be used to inform the design of a Gamification based solution for the purpose of domestic energy conservation. This is part of a larger project for which we received Queensland State Government funding. This project aims to operationalise this research in a real-life setting and test its applicability as a mechanism to promote a conservation culture.

References


Appendix A

Zichermann’s Gamification architecture template – Source: http://Gamificationu.com/

PROJECT NAME

Gamification Architecture Template

Name

Company

Date

Brief Description of the Project

Business Objectives

Key Stakeholders Required

Key Metrics & How They Are Measured

Player Story (Stories) - include player types

Describe the Various Stages of Mastery

Point System(s)

Level Descriptions

Badges, Other Achievements

Leaderboards

Rewards/Prizes/Incentives (Remember: SAPS)

Social Reinforcement

Win Conditions

Points of Integration with Technology/System

Onboarding (the first few minutes)
Appendix B

Interview Question Guide

Initial demographic questions.

1. What is your age?
2. What is your marital status?
3. What is the highest level of education you have completed?
4. What is the primary language spoken in your household?
5. Do you identify as being Aboriginal or Torres Strait Islander?
6. Do you rent or own the home you are living in?
7. How long have you been living in that home?
8. How many bedrooms are in your home?
9. Including yourself, how many people live within your household?
10. Are there any children under the age of eighteen years currently living in your household

Questions about internet, social media and video game use

11. What computing technologies are present in your home? E.g. desktop computer, laptop computer, iPad, android tablet, or smartphone
12. Which of those devices do you use to access the internet?
13. How long have you been using the internet?
14. What do you do on the internet at home?
15. Which domestic duties do you complete by using computing technologies? e.g. internet banking, internet shopping, read the newspaper, organising your income tax or paying bills?
16. Please tell me about your social media use?
   a. What sites?
   b. How often?
   c. Games on those sites?
17. Which video games do you play?
   a. How often?
   b. What types of games do you like?
18. Do you play games on your smartphone?
   a. If yes, what is your favourite game?
   b. Tell me a bit about the game.
19. Do you use any applications or games to help you track your behaviour? (e.g. brain training weight loss or exercise applications) If so, what is the name of the app/game.
20. Please tell me some key features of the application or game that you like.
   a. Why do you like these features?
21. Are there any features you dislike about the application or game?
   a. Why do you dislike these features?

Questions about home energy use
22. Would you describe your household energy use as low medium or high?  
   a. Why?
23. Would you describe your personal energy use as wasteful, average, or efficient?  
   a. Why?
24. Do you have monitoring devices for your electricity use?  
   a. If no, have you ever considered obtaining a device to monitor your power use?
25. What is the difference between a kilowatt and a kilowatt hour?  
   a. A kilowatt is the unit used to measure the amount of power something uses and a  
      kilowatt hour is the amount that it’s using within a one hour period
26. Do you still have the energy rating stickers on your appliances or have you removed them?
27. Did the energy rating stickers influence your decision to buy your specific appliances?
28. How much energy does your refrigerator use?
29. Do you have a second fridge or freezer?
30. What water temperature do you use to wash clothes?
31. How do you dry your washing?
32. Do you have air-conditioning?
33. Do you have ceiling fans?
34. Do you have insulation?
35. Do you have a gas or electric stove?
36. Do you have gas, electric or solar hot water?
37. Do you have a pool?
38. What type of bulbs do your ceiling lights have?
39. Do you have any free standing lamps?  
   a. What types of bulbs are in those lamps?
40. What are your main methods of cooking? E.g. stove top, microwave, oven etc..  
41. Do you think your energy bill is too high?
42. What would motivate you to reduce your home electricity use? For example: monetary  
    incentives, competition, setting goals and achieving them?
43. Would you consider adjusting behaviours to be more energy efficient?
44. If you decided to start reducing your energy use, what would be the first thing you do?
Appendix C

Interview Script

Introduction

Hi xxxx

Thanks for agreeing to participate in this telephone interview with me. I expect this phone call will take around 30 minutes to complete.

Informed Consent

I just need to obtain your informed consent before we proceed. I’ll just run through a few items and at the end of it I’ll ask for your verbal consent.

1. Your participation will involve a questionnaire and the results will be stored on a password protected file on a password protected computer
2. Your responses and any information from this interview will be de-identified.
3. Your participation is entirely voluntary, and you have the right to refuse participation or withdraw at any time.
4. I am using recording software which allows me to transcribe and analyse the responses.
5. This study has been cleared by one of the human ethics committees of the University of Queensland. If you would like to speak to an officer of the University not involved in the study, you may contact the Ethics Officer on 3365 3924

Is there anything you would like me to explain again or in more depth?

Do you give informed consent to participate in this interview?

Interview Start

Ok I’ll just give you a quick rundown of the interview questions.

First I’ll ask some general demographic questions, then I’ll ask a bit about your internet, social media and video game use, and following that I’ll ask about your home energy use.

Some questions will be straight yes or no answers, some will be one word or one sentence answers, and some are designed to let you tell a bit of a story about something.

There are no wrong answers in this at all, so you are absolutely free to say what you like. If there are any questions you don’t feel comfortable answering just say pass and that is fine.

Ok, let’s get started.
## Appendix D

### In-home Technology and Energy Inventory

<table>
<thead>
<tr>
<th>Area</th>
<th>Light Type and Number</th>
<th>Other Electricity use</th>
<th>Computing Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I = Incandescent</td>
<td>Fans</td>
<td></td>
</tr>
<tr>
<td></td>
<td>F = Fluorescent</td>
<td>Air con etc.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CF = Compact Fluorescent</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<p>| Kitchen    |                       |                       |                     |
| Living Room|                       |                       |                     |
| Lounge     |                       |                       |                     |
| Bathroom   |                       |                       |                     |
| Bedroom 1  |                       |                       |                     |
| Bedroom 2  |                       |                       |                     |
| Bedroom 3  |                       |                       |                     |
| Office     |                       |                       |                     |
| Garage     |                       |                       |                     |
| Outside    |                       |                       |                     |</p>
<table>
<thead>
<tr>
<th>Item</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stickers on appliances</td>
<td></td>
</tr>
<tr>
<td>Refrigerator energy use</td>
<td></td>
</tr>
<tr>
<td>Refrigerators in use</td>
<td></td>
</tr>
<tr>
<td>Freezers in use</td>
<td></td>
</tr>
<tr>
<td>Water temperature for washing</td>
<td></td>
</tr>
<tr>
<td>Clothes dryer or air dry</td>
<td></td>
</tr>
<tr>
<td>Insulation</td>
<td></td>
</tr>
<tr>
<td>Stove Gas or electric</td>
<td></td>
</tr>
<tr>
<td>Hot water Gas, electric or solar</td>
<td></td>
</tr>
<tr>
<td>Pool</td>
<td></td>
</tr>
</tbody>
</table>
Appendix E

E.1 System Focus

The system focus encompasses aspects of the architecture that are focused toward system specific concepts. These concepts are system objectives, key metrics, and integration with technology.

E.1.1 System Objectives

The system objectives focus on the reason for a gamified system. What the system hopes to achieve by implementing Gamification techniques. These objectives can be pre-determined as is usually the way a system is designed. However, further objectives may be presented to the design team as the system is being developed.

E.1.2 Key Metrics

Key metrics are the measures designed into the background of the system to evaluate user engagement in relation to the objectives. Engagement or the E-Score, according to Gamification.org (2012), is identified as being the most important metric to measure success in Gamification. The E-score is comprised of five metrics:

1. **Recency** – How long ago did they visit?
2. **Frequency** – How often did they come back?
3. **Duration** – How long did they stay?
4. **Virality** – How many people have they told about you?
5. **Rating** – What did they explicitly say when asked about you?

E.1.3 Integration with Technology

How the system will integrate with existing technology is an important aspect to consider. For example, a smartphone application, a dedicated device, or a website is three examples of how this can be accomplished. Understanding which technologies exist in the user space, and how a new technology can impact the user is important for design decisions.

E.2 Activity Focus

The activity focus of the system groups together the Gamification elements, Gamification mechanics, activity loops, and win conditions. Gamification elements construct the Gamification mechanics which in turn are applied in activity loops to engage and reengage users. The engagement loops motivate the user to progress through the system. The progress is focused with a
progression loops. Finally, when the endgame is met, the win condition is achieved by the user. The win condition is the ultimate goal of the system. A debate amongst practitioners and researchers regarding the elements and mechanics of a gamified system has emerged. A brief understanding to this disagreement of concepts will help to situate my proposed taxonomy.

Game mechanics are defined by Sicart (2008) as methods invoked by agents for interacting with the game world. However, what exactly constitutes a mechanic is a point of debate amongst practitioners and researchers of Gamification. Zichermann and Cunningham (2011) explicitly identify seven key Gamification mechanics: points, levels, leaderboards, badges, challenges/quests, onboarding, and engagement loops. Whereas Bogost (2011) refutes Zichermann and Cunningham’s claim by arguing that mechanics are actually the operational parts of games that produce an experience of interest, enlightenment, terror, fascination, hope, or other sensations. Bogost does not propose mechanics per se, but more alludes to the fact that mechanics are constructed by elements (operational parts of games). Bogost asserts that points and levels act as mere gestures that provide structure and measure progress within such a system. Add to this Deterding et al.’s (2011) suggestion that game elements should be treated as a set of building blocks or features shared by games (rather than a set of necessary conditions for a game); and agreeing on a taxonomy becomes difficult.

Bogost and Deterding et al.’s arguments imply that certain elements employed in a structured way form mechanics for the users to interact with. This helps to situate Zichermann and Cunningham’s key mechanics and provide a further level of granularity to these terms to help clarify their role in Gamification. Based on this, I have arranged the basic ‘atomic level’ elements of points, levels, leaderboards, and badges separate to onboarding, challenges/quests, and engagement loops. This can be seen in the below table:

<table>
<thead>
<tr>
<th>Elements</th>
<th>Mechanics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Points</td>
<td>Onboarding</td>
</tr>
<tr>
<td>Levels</td>
<td>Challenges/quests</td>
</tr>
<tr>
<td>Leaderboards</td>
<td>Engagement loops</td>
</tr>
<tr>
<td>Badges</td>
<td></td>
</tr>
</tbody>
</table>

The reasoning for this taxonomy is because the elements on the left can be used to enhance or construct the mechanics on the right. There is a symbiotic relationship with mechanics and
elements; game mechanics can influence the elements, and vice versa. For example, points can be awarded to users based on how close they come to a time constraint in a challenge or quest. Mechanics provide meaning to the elements by structuring rules and constraints around them to provide enjoyment for users.

E.2.1 Gamification Elements
The elements of a gamified system are the fundamental building blocks which come together to construct the desired game mechanics. To draw a physics based analogy, elements are similar to atoms, and mechanics are the molecules. The atoms join together to form molecules, similarly, elements come together to construct mechanics. The basic elements present in gamified systems are points, levels, leaderboards, and badges. Points are the most common elements of any game. Generally the idea of a points based game is to accumulate points by doing certain activities. Points are a key element of a gamified system which satisfies one of the basic human needs, to collect things (Reiss, 2004). Levels are quite often point thresholds that indicate progress (Zichermann and Cunningham, 2011). As more points are collected, the player progresses through higher levels. Quite often, progressing through levels means harder challenges and with that comes greater rewards. Leaderboards leverage the basic human need of status, which promotes the intrinsic feeling of self-importance (Reiss, 2004). Leaderboards can be count based (e.g. number of posts on a forum) or skill based (e.g. amount of electricity saved this month). The purpose of a leaderboard is to promote the most successful users of a particular system. Badges have motivational elements of status, honour, and collecting (Reiss, 2004) which are powerful drivers for action. Badges are an effective way to encourage social engagement and promote a system. Badges can be designed for almost any achievement in a system, and are effective ways to guide new users throughout the onboarding process.

The use of game elements are promoted heavily in Gamification. This can lead to the confusion, that just by adding pointless elements to an existing system it has been gamified (for example see Kleinberg, 2012). However, game elements should be used to construct the mechanics. For example, using badges and points as elements to denote progression towards the mechanic of a challenge is an effective use of Gamification.

E.2.2 Gamification Mechanics
The Gamification mechanics are defined by Sicart as methods invoked by agents for interacting with the game world. There are numerous ways to assemble mechanics for a gamified system by leveraging various combinations of Gamification elements matched with constraints such as time. There are three mechanics argued by Zichermann and Cunningham as being important to
Gamification. The first is onboarding which is a process designed to engage new users and guide them into a new system. The second is the use of challenges and questions to provide a guide for the user so they know what actions to undertake. The third is the extrinsic rewards such as badges or in-game virtual gifts.

E.2.3 Game Dynamics

Game dynamics is defined as the users’ interactions with game mechanics (Zichermann and Cunningham, 2011), or in other words, members methods of interaction with the game world. The users’ interaction with the system is shaped dynamically in response to the mechanics employed. For example, a popular website called bodybuilding.com has a reputation system in its forum. Forum members can assign reputation to other users for their forum contribution. Conversely, the users can also remove reputation from a user they feel mad a negative contribution to the forum. This reputation system is used to identify legitimacy in the forum; with ‘green’ users being seen as more favourable to ‘reds’. A green and red user can be seen below. This mechanic of reputation, using the elements of coloured bars and a points system is being used dynamically by the forum users as a way of identifying legitimacy and denoting forum seniority.

![Figure E.2.3.1 – Example of Dynamics](http://forum.bodybuilding.com/showthread.php?t=154703613)

E.2.4 Social Reinforcement

Social reinforcement is constructed of activity loops that encourage the user to re-engage with the system and win conditions. In contrast to Zichermann and Cunningham’s claim that the Player Focus is the most important aspect of the system; Werbach and Hunter (2012) argue that the social
reinforcement section of the activity focus is the most important section. According to Werbach and Hunter there are two types of loops: engagement loops, and progression loops. Engagement loops are system focused and designed to drive the action within a gamified environment. The loop consists of: motivating user engagement, an action taking place, and feedback to reinforce the behaviour. Progression loops are player focused and designed to craft the player journey within the system. Progression loops are intended to guide the player through the system and progress them to mastery. It involves dividing the overall objective up into smaller more achievable challenges to allow progression through the system. The win condition is the combination of events and accomplishments that players need to achieve in order to end the game. For systems that do not have an end, there needs to be some overall goal to drive the player to continue with the system.