Gamification Risks in Collaborative Information Systems: Identification and Management Method

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Abstract

In recent years, technology has been increasingly harnessed to play a role in encouraging and persuading people towards a better achievement of their individual and collective goals. Gamification solutions are popular approaches in this field. Gamification in business refers to the use of game elements in order to facilitate a change of behaviours, encourage engagement and increase motivation toward executing tasks and attaining goals. Despite the increasing recognition, previous research has revealed risks when applying gamification to teamwork within a business environment, such as negatively affect group coherence and creating adverse work ethics. For example, applying competitive elements such as leaderboards may lead to clustering amongst team members and encourage adverse work ethics such as intimidation and pressure. Although the problem is already recognised in principle, there is still a need to clarify and concretise those risks, their factors and their relation to the gamification dynamics and mechanics. Moreover, developing an integrated method to systematically identify those risks and provide a way to mitigate and prevent them for healthier and successful implementation of the system in teamwork places is needed.

To achieve this goal, this thesis conducted a set of empirical studies involving managers, practitioners, psychologists and gamification users. This includes three-stage empirical research in two large-scale businesses using gamification in their workplace, including two months' observation and interview study. This resulted in identifying a set of risk factors, a taxonomy of risks and set of management strategies. A follow-up focus groups research study also identified the modalities of application of these strategies, including who should be involved and how in their implementations. These studies first resulted in the development of a checklist tool to help identify gamification risks. The findings were finally used to develop a method to systematically identify gamification risks and recommend design practices and strategies to tackle them.

By accomplishing that, this thesis recommends that gamification in enterprises shall undertake a risk assessment and management process to cater for its potential side effects on teamwork. A notable recommendation is to use participatory decision style for the method that enables for the analysis of gamification risks and their resolution. Moreover, this thesis recommends studying how to integrate the risk identification processes, which should take an iterative participatory style with the systems' development life cycle activities.

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1. CHAPTER 1: INTRODUCTION

Gamification in business refers to the use of technology-assisted solutions to boost or change staff attitude, perception and behaviour, in relation to certain business goals and tasks, individually or collectively. Deterding et al. (2011) defined gamification as "the use of video game elements in non-gaming systems to improve user experience (UX) and user engagement". Nixon (2004) describe that the application of gamification is to improve the productivity and engagement of users in individual or collective activities. The set of such rewarding and gaming mechanics include leader boards, badges, points, avatars reflecting individual and collective performance, levels and status. For example, rewards can be given to individual staff or teams in a technical support call centre based on the amount and speed of answering calls, fixing issues, and customer feedback. Gamification is increasingly gaining popularity in organizations. The strategy is now being used to improve individual and collective performance, teamwork development and persuasion, encouragement, and motivation of individuals and teams (Fogg 2002a). The increased adoption of gamification in organizations is in recognition of value creation by the concept within the business environment (Huotari and Hamari 2016).

In the literature various gamification solutions have already been successfully implemented in areas such as the health sector to encourage healthier style (Johnson et al. 2016), education to increase student engagement in classroom activities (O'Donovan et al. 2013), sport to motivate people to be more physically active (Lacroix et al. 2009), and business for increasing sales and productivity (Robson et al. 2016, Herzig et 2015). An example of gamification used in a business is when banks encourage customers to use a gamified e-business application by giving them points for each e-transaction. Another example of gamification could be a call centre that uses leaderboards or avatar to encourage staff to increase the amount and the speed of answering and solving customers' calls. Despite the increasing application of such techniques, previous research indicated several risks when gamification is added to a business environment with the aim of motivating staff working in teams to increase their performance. This includes adverse work ethics such as work intimidation and lack of group cohesion (Shahri et al. 2014,

Algashami et al. 2018, Shahri et al. 2019). These risks can have negative effects in the teamwork environment and may actually be detrimental to achieving the business goals.

Gamification is on the rise and there exist already various established domains which characterise it including Persuasive Technology (Fogg 2002b), Gamification (Deterding et al. 2011), Games with Purpose (Ahn 2006) and Entertainment Computing (Magerkurth et al. 2005). Central to gamification is the use of technology (including games and social computing), to prevent, change, maintain or enhance certain behaviours and attitudes in relation to certain policies, goals, tasks, and social inter-relations. The advances in technology, including mobile and sensing technology, and the increased familiarity of the public with advanced features of Web 2.0, games and social computing have made these techniques possible and acceptable.

Gamification and persuasive technology have been increasingly studied in the literature as the two main approaches for technology-assisted behaviour change (Hamari et al. 2014). There exist different methods and principles for developing such technologies. Fogg (2009) proposes eight steps of developing and introducing Persuasive Technology. The emphasis in these steps is on the choice of behaviour, the audience and finally, understanding the obstacles. Nicholson (2012a) proposes a theoretical framework for a 'meaningful gamification' intended to avoid the risk of losing intrinsic motivation when tasks. Other principles are either focused on a single property of gamification or coupled with certain application areas. For example, Consolvo et al. (2009) focus on goal-setting and explore ways to elicit goals and specify their time frames. Gram-Hansen (2016) proposes an approach based on participatory design and constructive ethics to achieve a persuasive design.

Oinas-Kukkonen and Harjumaa (2009) presented a framework for designing and evaluating the persuasive system, the Persuasive System Design (PSD) model. The PSD model consists of three main steps to illustrate the development process: Understanding the issues before implementing the system; analysing the persuasion context; and designing the content and functionality of the system. Nicholson (2012b) proposed a user-centred theoretical framework for 'meaningful gamification' which looked at the users' needs and goals over the goals and need of the organisation. Finally, Huotari and Hamari (2012) emphasised that a gamification

system should be used to add value to an organisation, e.g. increasing staff desire to work and to enhance services to support users overall value creation.

In contrast, the evolution of gamification within the business concept has led to the emergence of new challenges. One of the major problems with gamification is the adoption of a single strategy, no standardization, and production of one-size-fits-all concepts yet there are different contexts within which gamification may and may not produce the desired objectives. Challenges such as the lack of a plausible framework for gamification have resulted in the continued existence of the problems identified with gamification. According to (Raftopoulos 2014), such challenges inform the need for further research in gamification.

Gamification risks have a unique nature comparing to other information systems risks discussed in the literature. Ethical concerns and negative connotations of gamification as being an exploitation tool are increasingly becoming a primary concern when deciding to adopt gamification solutions in enterprises. Kumar (2013) identified five steps towards the design of such motivational systems and their game elements and named the approach as "Player Centred Design". The emphasis is on the awareness of ethical considerations in the design process. Nicholson (2012b) emphasised that the gamification system might be seen as "exploitation-ware" when implemented to drive users to do more than their job requires. Apter and Kerr (1991) highlighted the unwanted effects - such as stress and anxiety - resulting from pressures for efficiency through the application of gamification on staff daily tasks. Thiebes et al. (2014a) conducted a systematic literature review on design for motivation through gamification and found that research on the risks of these elements is still in its infancy and opens the way for more research in the area. As a result, this thesis advocates that adding gamification to a business work environment have potential risks on teamwork.

Risks of gamification systems applied in an enterprise stem mainly from their usage or perceived usage as an appraisal and performance monitoring mechanism, as well as a pressure tool to perform better. Gamification elements can be used to motivate individuals via self-monitoring and self-comparison. For example, a progress bar can be used to encourage delivery staff to distribute a parcel within a specific time frame and following a specific process by showing them their current status and the remaining time and stages. Peer-comparison is

another modality which can increase the perception of gamification as a pressure or intimidation tool. This includes elements like leaderboards, levels and badges assigned to individuals but visible to all team members and meant to motivate by reflecting and acknowledging individual metrics, such as customers' feedback on them.

Risk management is a subject of research in various areas, including information systems, business process management, and enterprise modelling (Alter and Sherer 2004, Muehlen and Rosemann 2005, Suriadi et al. 2014, Barata et al. 2015a). Risks modelling has been studied in various settings, such as in small and medium enterprises where risks should be captured and represented alongside the various stages of the system analysis and design lifecycle (Vilpola et al. 2006). Risk management has also been studied within the area of business process management for their effect on the flow of operation and its decisions (Suriadi et al. 2014). It has also been argued that the concern for compliance risks and operational risks should be incorporated during the design-time and also run-time stages of business processes (Zoet et al. 2009). Risks considered in enterprise modelling literature are mainly related to mainstream requirements such as security, privacy, compliance and capability (Zoet et al. 2009, Stirna et al. 2017). Gamification engineering methods, reviewed in (Morschheuser et al. 2018), are mainly focused on providing steps and techniques for designing the game mechanics in the first place and tend to overlook their risks.

This thesis demonstrates that the gamification system is not a one-size-fits-all approach and there is a lack of frameworks and standards to guide the process on how to identify and mitigate gamification risks in order to increase the successful implementation of such system in a business environment. This motivates this thesis to investigate the main risk factors and type of risks such system might introduce to the teamwork. Moreover, this thesis will explore the best practice to manage potential gamification risks. The focus of this thesis especially will be to propose a risk identification tool to support the risk assessment process of the proposed design of the gamification system. This will require studying the system in its actual implementation at the workplace. Also, it requires understanding stakeholders' requirements from such systems including users and managers and how they cannot introducing negative effects to the work environment.

1.1   PROBLEM BACKGROUND

- Previous research indicated several risks (e.g. social loafing and freeriding) when gamification is added to a business environment (Shahri et al. 2014).

- Nicholson (2012b) emphasised that the gamification system might be seen as "exploitation-ware" when implemented to drive users to do more than what their jobs are required.

- Apter and Kerr (1991) highlighted the unwanted effects - such as stress and anxiety - resulting through the application of gamification on staff daily tasks.

- Gartner says, 80 Percent of current gamified applications will fail to meet business objectives primarily due to poor design. (Gartner, 2010)

- Thiebes et al. (2014a) concluded that research on the risks of gamification elements is still in its infancy and opens the way for more research in the area..

1.2   THESIS AIM

This thesis aims to explore the risk of gamification in a teamwork place and to propose a systematic engineering method that enables for risk assessment including risk identification and mitigation of proposed gamification design. System analysts, management and subject stakeholders (staff) will participate in the investigation process and in the proposed method itself.

1.3   THESIS QUESTIONS

Based on the aim of this thesis, the following questions were proposed to specify the focus of the research and deliver answers through practical investigations and stages:

Q1: What are the main risk factors and categories of risks associated with the certain implementation of gamification in teamwork places?

Q2: What are the management strategies that could help to mitigate gamification risks from psychological and management perspectives?

Q3: What are the possible modalities of applications of the management strategies for better and effective gamification risk mitigation?

Q4: How to translate the finding of Q2 and Q3 into a design method which could help to guide the risk identification and mitigation process?

1.4 THESIS OBJECTIVES

To provide answers to the research questions and to achieve its aim, this research will be conducted to deliver the following objectives:

<u>Objective 1</u>: To Conduct a Literature Review of Gamification and Related Topics

The research will review the literature in the field of gamification and related topics, e.g., Persuasive Technology, in order to gain a clear understanding of methods and theories from psychology and computing perspectives. This objective review previous results proposed in (Shahri et al. 2014, Shahri et al. 2016). The exploration will help to propose an initial templet of gamification risks in order to start and guide the investigation process in **Objective 2**.

<u>Objective 2</u>: To Explore the Risk Factors and Gamification Risks when applied in a Teamwork Environment

It has been shown in (Shahri et al. 2016) that gamification could be correlated with negative side-effects such as social loafing, feeling of unfairness and unofficial clustering, which might occur in gamification teamwork places. Thus, this objective aims to provide a holistic view and propose a conceptualisation of the main risk factors in the gamification system including the social and organisational structure. This is meant to help system analysts and managers to gain a holistic idea of the main sources of risks that might cause failure in the implementation of the system in the workplace. Moreover, the objective seeks to reveal the most likely types of risks that might prevent the successful implementation of such a system to deliver its main goals to the work environment.

<u>Objective 3</u>: To Explore the Strategies and Design Principles to Manage Gamification Risks on Teamwork

This objective will build on the results of **Objective 2**. This objective aims to identify a set of management strategies from psychology and management perspectives in order to optimise the risk mitigation process. These strategies need to be consolidated through empirical studies

involving managers and staff. The strategies will be classified based on their purpose in order to facilitate their application to the management of gamification risks. Management strategies and their classification are intended to inform system analysts and management regarding different design practices to manage potential risks of gamification on teamwork.

Objective 4: To Identify Modalities of Application of Management Strategies for Gamification Risk Identification and Mitigation

This objective will build on the result of **Objective 3**. This objective aims to identify a set of modalities of application of the proposed management strategies in **Objective 3**. The modality of application includes the different purposes of usage, styles of applications, timings and stakeholders. These modalities of application are meant for effective implementation of management strategies to increase the validity and success of system application in the teamwork places. The objective will also provide foundations for these modalities of applications in order to guide and facilitate decision-making based on these modalities for effective gamification risk mitigation processes.

Objective 5: To Develop and Evaluate a Method for gamification Risks Identification and Mitigation

The results of **Objective 2** will be utilised for further empirical investigation in order to propose a checklist-based risk identification tool. The checklist tool is meant to help stakeholders involved in a decision-making session to identify gamification risks in a proposed design. Based on this and on the results of **Objectives 3** and **4**, this objective will propose a systematic method for the identification and mitigation of gamification risks when applied to teamwork.

The objective will utilise a case study approach to validate the artefacts in practical proposed gamification design. The evaluation study will involve all related stakeholders in decision-making sessions to assess the ability of the proposed method to assist risk identification and mitigation. The method will be assessed based on a set of qualities (usefulness, clarity, coherence, completeness and effectiveness) from the stakeholders' points of view in the validation sessions.

Research Question	Research Objectives	Chapters
Q1: What are the main risk factors and categories of risks associated with the certain implementation of a gamification system in the teamwork places?	**Objective 1** **Objective 2**	**Chapter 3** **Chapter 4**
Q2: What are the management strategies that could help to mitigate gamification risks from psychological and management perspectives for better implementation of the system?	**Objective 1** **Objective 3**	**Chapter 5**
Q3: What are the possible modalities of application of the management strategies for better and effective gamification risk mitigation?	**Objective 4**	**Chapter 6**
Q4: How to translate the finding of Q2 and Q3 into a design method which could help to guide the risk identification and mitigation?	**Objective 5**	**Chapter 7** **Chapter 8**

1.5   THESIS STRUCTURE

An overview of the thesis structure is shown in **Figure 1**. This thesis is structured as follows. **Chapter 2** presents a multidisciplinary related literature review of the main research topics. **Chapter 3** provides descriptions of the methodology followed to achieve the research objectives. **Chapter 4** presents a conceptualisation of gamification risk factors and potential risks. **Chapter 5** explores a variety of management strategies for better management of the gamification risks identified. **Chapter 6** presents different modalities of application of the management strategies in order to increase the validity and effectiveness of the proposed management strategies. **Chapter 7** explains the proposed risks identification and management method. **Chapter 8** presents the evaluation of the method proposed by this thesis. **Chapter 9** provides a summary of the thesis and discusses its limitations as well as topics for future work.

Chapter 1: Introduction			
Aim	Questions	Objectives	Publications

Chapter 2: Literature Review	
Gamification and Related Topics	Software Risk Managment Methods

Chapter 3: Research Methodology			
Research Philosophies	Research Approaches	Research Strategy	Research Methods

Chapter 4: Conceptualisation of Gamification Risk	
Five Main Risk Factors with 15 Sub-factors	20 Exemplars of Risks

Chapter 5: Exploring Gamification Risks Management Strategies	
22 Management Strategies	Three Main Categorise

Chapter 6: Identifying Management Strategies Modalities of Application			
Purpose of Use	Application Styles	Application Time	Stakeholders

Chapter 7: Developing GamRisk Method	
Risk Identification	Risk Mitigation

Chapter 8: Evaluating GamRisk Method

Chapter 9: Conclusion and Future Work

FIGURE 1: RESEARCH CHAPTERS ROAD MAP

1.6   PUBLICATIONS ARISING FROM THIS THESIS

Publications arising from this thesis:

- Algashami, A., Cham, S., Vuillier, L., Stefanidis, A., Phalp, K., and Ali, R., 2018. Conceptualising Gamification Risks to Teamwork within Enterprise. *In*: *The Practice of Enterprise Modeling*. Cham: Springer, Cham, 105–120.
- Algashami, A., Shahri, A., McAlaney, J., Taylor, J., Phalp, K., and Ali, R., 2017. Strategies and Design Principles to Minimize Negative Side-Effects of Digital Motivation on Teamwork. *PERSUASIVE*, 10171 (2), 267–278.

- Algashami, A., Vuillier, L., Alrobai, A., Phalp, K. and Ali, R., 2019. Gamification Risks to Enterprise Teamwork: Taxonomy, Management Strategies and Modalities of Application. *Systems*, 7(1), p.9.

The author contributions, as a co-author, in related researches:

- Alrobai, A., Algashami, A., Dogan, H., Corner, T., Phalp, K., and Ali, R., 2019. COPE.er method: Combating digital addiction via online peer support groups. *International Journal of Environmental Research and Public Health*, 16 (7), 1162.
- Cham, S., Algashami, A., Aldhayan, M., McAlaney, J., Phalp, K., Almourad, M. B., and Ali, R., 2019. Digital Addiction - Negative Life Experiences and Potential for Technology-Assisted Solutions. *WorldCIST*, 931 (6), 921–931.
- Cham, S., Algashami, A., McAlaney, J., Stefanidis, A., Phalp, K., and Ali, R., 2019. Goal Setting for Persuasive Information Systems - Five Reference Checklists. *HCI*, 11433 LNCS (9), 237–253.

1.6.1 DECLARATION OF AUTHORS CONTRIBUTION

The author of this thesis was the first author of the publications arised from this thesis. The contribution of the first author was as follows:

- Forming and articulating the idea and aim of each paper.

- Deciding upon the appropriate methodology to be adopted in each paper (e.g. Mixed Method Design).

- Designing and implementing the empirical studies presented in each paper (e.g. developing interview scripts, recruiting the participants, collecting the data, etc).

- Analysing and interpreting the collected data and draw the conclusions (e.g statistical analysis, qualitative and quantitative analysis, etc).

- Reporting the findings and fully writing each paper.

The co-authors contributed to the published papers in terms of verifying and validating the studies' findings by comparing them against the actual responses from the participants. They also provided guidance and feedback on the structure and the overall articulation of the papers' message. In addition, they gave insights on the methodology and also checked the writing quality and suggest modifications on some parts of the text. Furthermore, the co-authors enriched the papers with the appropriate terminologies in certain places especially those related to the venue where the papers were published.

1.7 CHAPTER SUMMARY

This chapter provided an overview of the thesis research main focus. This includes an introduction to the topic and related topics, the thesis aim, questions, objectives, the research publications arising from this thesis and the thesis structure. The next chapter will provide a review of the main topics related to the thesis main focus.

2.   CHAPTER 2: LITERATURE REVIEW

This chapter presents an overview of gamification and its related theories, concepts and design approaches and related topics such as persuasive technology and serious games. Further, reviewing of motivation theories from a psychology perspective including human needs theories will be provided to enrich the understanding of the digital application of such concepts and the effects it may introduce to human and their related needs.

The chapter also aims at producing an initial template of risks associated with the implementation of digital motivation techniques in the work environment. This can be achieved by reviewing further topics related to group dynamics, risk management in software development projects, gamification ethics and employees well-being. All these research efforts will help to define the research problem and scope as well as produce the studies materials to initiate the scientific investigation. The chapter will start by discussing the gamification and related concepts. This will be followed by covering some related psychological concepts and theories.

The literature section of this thesis will help to cover the research questions through (i) reviewing gamification and related issues which would help to draw the initial draft for the first question of the thesis (Q1: What are the main risk factors and categories of risks associated with the certain implementation of a gamification system in the teamwork places?), (ii) the second main focus of the literature is to present topics related to risk management in software development projects which will provide a background of the focus of Q2, 3 and 4 which are related to the risk identification and mitigation of the gamification system. More details of the main focus of the literature are presented in **Figure 2.**

Literature Review Vs Research Questions

Risk Management in Software Development Projects
Risk Management Stages and
Risk Identification Techniques

Q2: What are the management strategies that could help to mitigate gamification risks from psychological and management perspectives?

Q3: What are the possible modalities of applications of the management strategies for better and effective gamification risk mitigation?

Q4: How to translate the finding of Q2 and Q3 into a design method which could help to guide the risk identification and mitigation process?

Digital Motivation (Practices and Frameworks)

Gamification, Persuasive Technology, Serious Games

Human Motivation (Theories and Practises)

Need Theory, Cialdini Principles of influence , Self determination theory (SDT) , Self-regulation theory (SRT) , Panopticon effect

Q1: What are the main risk factors and categories of risks associated with the certain implementation of a gamification system in the teamwork places?

FIGURE 2: LITERATURE REIVEW FOCUS VS. RESEARCH QUESTIONS

2.1   GAMIFICATION

Gamification is defined as the use of game elements in "non-game contexts" with the purpose of changing behaviours, increasing motivation and engaging users (Deterding et al. 2011). Nixon (2004) described that the application of gamification is to improve the productivity and engagement of users in individual or collective activities. The set of such rewarding and gaming mechanics include leader boards, badges, points, avatars reflecting individual and collective performance, levels and status. It can be used in both industrial and academic environments to encourage people to change their behaviour towards specific goals or to encourage them to engage more in a task using game mechanics (e.g. leader-boards, badges, points). It is a great tool that can utilise the magical power of games and apply them in a serious context e.g. work or learning to solve problems or increase desire and performance. Gamification, as it's used today, aims to create digital interaction with users to engage them more in a task or guide them toward achieving desire goals either through approach theory like fitness applications (Molden and Finkel 2010) or through avoidance theory like motivating people to reduce smoking habits (Pløhn and Aalberg, 2015).

From a border research perspective, most of the published related works are focusing on philosophical, theoretical and conceptual insights of the topic with limited recognitions on research which can practically inform the design of such system and provide guidance for

business decision-making within organisations (Raftopoulos 2014). The author added that the literature agreed on the need for research to directly help to involve project leaders and decision-makers to explore their experiences and perspectives about gamification application on the organisation field. The focus of this thesis is to involve people from multidisciplinary related areas in a decision making a session for the perspective of identifying the potential gamificaion risks which might affect the validity of the system in a business workplace.

Several approaches exist in the literature toward developing frameworks and methodology for designing gamification in business-oriented context (Herzig et al. 2015). However, specific aspects still have lack of clarity such as the stakeholders to be involved in the design process. Moreover, the impacts such a system might introduce to the work environment e.g. the effect it might have on the social and psychological well-being, ethics and quality of work. In addition, lack of researches focuses on the human factors of such system as the system engineering approaches affect both the technical components and the element of human factors (Dogan et al 2011). In the following sub-sections, the focus will be in reviewing gamification related topics in the literature such as design practices and methods, gamification mechanics gamification and related issues and gamification application in a business environment.

2.1.1   GAMIFICATION DESIGN

Different gamification design purposes are existing in the literature. The common focus aspects in the literature are the positive affect gamification might introduce to users' behaviours (Mollick and Rothbard 2013), user entertainment from using such system (Aparicio et al. 2012, Herzig et al. 2012) and increase users' quality of work (Cechanowicz et al. 2013, Pedreira et al 2015a). Moreover, the literature has different design practises and principles toward design gamification and what it can help to achieve. However, the understanding of how to increase the successful implementation of such a system has not been achieved yet (Morschheuser et al. 2018). The following paragraphs will present some empirical research discussing some design practises and principles of gamification system.

Nicholson (2012a) proposed a theoretical framework for a 'meaningful gamification' intended to avoid the risk of losing intrinsic motivation when gamifying tasks. The framework

is utilising user-centred approach which assists to look at the users' needs and goals over the goals and requirements of the organisation. Moreover, designers should allow personal customisation of such a system in order to provide users with the ability to create their own activities within the system. The author concluded the meaningful gamification main focus is to encourage the play element in the system rather than the scoring elements. This will be resulted in longer-term users' engagements and non-game activities to support the organisations' goals.

Huotari and Hamari (2012) emphasised that a gamification system should be used to add value to an organisation, e.g. increasing staff desire to work and to enhance services to support users overall value creation. The authors proposed a definition of gamification from a service marketing perspective as '*a process of enhancing a service with affordances for gameful experiences in order to support the user's overall value creation*".

Kumar (2013) identified five steps towards the design of such motivational systems and their game elements and named the approach as "Player Centred Design". The core idea of the approach is to put a player (user) at the centre of the design and development of the system. The steps are (understanding players, understand the mission, understand human motivation, apply game mechanics and manage, monitor measure). Upon all of that, the authors emphasised the importance of ethical considerations in the design process.

Thiebes et al. (2014a) conducted a systematic literature review on design for motivation through gamification and how it is applied to the information system. They identified different game mechanics and dynamics and illustrated that gamification has a great potential to increase users' motivation which will lead to improvements in their productivity. They found that research on the risks of these elements is still in its infancy and opens the way for more research in the area. The authors recommend the need for more careful design decisions about the application of the gamification elements in the environment.

Morschheuser et al. (2018) summarised a method for engineering gamified system. The method was discovered through interviews with industry experts as well as through the systematic review of the literature. The process includes (1) project preparation, (2) context and

user analysis, (3) project ideation, (4) project design, (5) project implementation, and (6) evaluation (7) monitoring. Under the project preparation phase, there should be the focus on the project plan, the listing of objectives, project conditions, and the information that informs the decision to proceed or not proceed with the project. Under user and context analysis the focus is on the personals, success metrics, and other context characteristics. The project ideation stage incorporates the listing of ideas and documentation of concepts while the design stage involves the analysis of the design of user journeys, the design concepts, development of prototypes, and development of concepts. The implementation stage ensures that the gamification features are implemented together with the product while the evaluation and monitoring stage involves success evaluation of the project as well as the listing of improvements (Morschheuser et al. 2017). The framework is as shown below.
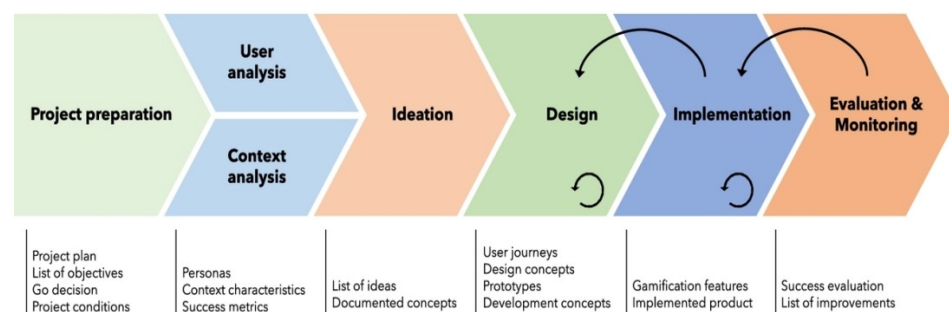
FIGURE 3: A METHOD FOR ENGINEERING GAMIFIED SOFTWARE MORSCHHEUSERET ET AL. (2017)

The gamification approaches and methods listed in the paragraph above are typical of the normal software engineering process (Mora et al. 2015). The only differentiating factor is the contextualization of the user journeys and design concepts in the design stage. Ideally, the user journeys and design concepts ought to be significantly different from those considered in the normal software engineering processes. The two areas also present the zones of complexity in designing of gamification software and gamified products.

Pedreira et al. (2015b), after observing the lack of guidance on designing gamification software also suggested a systematic mapping approach to the scripting guidance for designing of gamification software. Similar observations were consistently made by other researchers including (Creswell 2014). The observations are an indication of the continuing need for

definitive gamification frameworks and design methods or principles. It also provides the need for further research on the same subject.

Despite the attempts made toward proposing a methodology for gamification for a business information system, it still needs more clarification to explore related aspects. Identifying stakeholders that should be involved in the design process is still not clear and need further research. Moreover, the issues from an ethical perspective might exist in the application of the system in teamwork places and how to identify and manage them still are open for further researches.

2.1.2 GAMIFICATION MECHANISM

The feedback mechanism is one of the well-considered mechanics in relation to the gamified information systems (Wang and Sun 2011). The effective feedback design should follow the actions directly (Thiebes et al. 2014b). A good example of effective feedback design is the message used in a progress bar to indicate the stage in filling the online application form (Huotari and Hamari 2012). The design of a feedback mechanism should consider its application context. The feedback suitable to one context might cause negative effect in the other. Thus, the feedback should be examined in its context to ensure validity. For example, music and sound-based messages as feedback might be useful for some working places but causing issues in other places (Korn 2012).

Another sensitive aspect in relation to the design of gamification is the challenging mechanism. The challenging type of gamification is designed to motivate users by providing them with missions and rewards after task completion (Bunchball Inc 2010). In such a mechanism clearly goals should be identified and well-designed (Passos et al. 2019). Some challenging gamification systems using the time pressure e.g. progress bar. However, this might have negatively affected the quality of the works. For example, focusing on the number of answered calls in a call centre department might influence bad behaviours and affecting the quality of handling customers' calls.

The rewarding system is another important aspect of the gamification systems. Most of the gamification elements are based on rewarding mechanisms (Zichermann and Cunningham

2011). Mostly, the rewarding systems are using the points to reward users. Moreover, the bonus dynamic can be seen as a reflecting example of the application of a rewarding mechanism in a gamified task (Hiltbrand and Burke 2011). An important aspect which increases the successful use of the rewards in gamification is transparency (Nicholson 2012a). The transparency is either in the purpose of the gamification system or in the rewarding system strategy. The badge type of gamification system is a well example of the gamification elements based on the rewards. The badge system can be designed to increase users feeling of shared ownership (Hiltbrand and Burke 2011). For example, the badge given to a user based on the certain quality achieved on a task would help to increase the feeling of ownership.

Moreover, the social influences are also an effective aspect in the gamification system. The leaderboards stand as a gamification system based on the social influence mechanics. The leaderboards mechanism works by comparing a user performance to others and by demonstrating their capabilities. Thus, this can create a competitive environment between users (Hiltbrand and Burke 2011). The social influence is a risky element not suitable for every work environment. Another example of the social influence application in gamification system is the collaborative based gamification element. In this type, workers are working together to achieve goals and overcoming challenges (Hiltbrand and Burke 2011).

The levelling based gamification systems are reflecting another mechanism of the design of gamification elements. The level can reflect users' expertise or skills in a specific field. The level mechanics can be used to motivate users to complete a task by offering a move to a higher level after achieving the goal (Bunchball Inc 2010). The virtual avatar is representing the levelling mechanism. Users might move from avatar to another after finishing a task. This can increase users' engagements and motivation. The avatar also can be used to allow self-expression of users (Bunchball Inc 2010).

2.1.3   GAMIFICATION AND RELATED ISSUES

Gamification could cause ethical issues and have a negative effect on the mental and social well-being in the workplaces (Shahri et al. 2014, Algashami et al. 2018). This can be particularly when it is applied as a persuasive technology (Bogost 2011, Rafopoulos 2015).

The idea that technology can be used to influence behaviour change among the people and while at it, doing so to benefit the organization is always a question characterized by ethical dilemma (Kim 2015).

Gamification can be interpreted as manipulative and exploitative. Some researchers have referred to gamification as overt and maniacal. These aspects relate to the very fact that organisations are inspired by the potential to increase productivity and enhance performance when investing in gamification. This risk should be avoided when dealing with gamification in the organization (Thorpe et al. 2017).

One of the questioning attributes arise in relation to the application of gamification in a workplace environment is the expectation or obligation to play while the management control and observe workers (Raftopoulos 2015). This means the overt expectation to play might have a negative effect on the effectiveness of workers' engagement.

Another issue is the use of technology to shape workers' behaviours via the rewarding and punishing mechanism in such a system (Deterding 2012, Nicholson 2012b). The surveillance and transparency attributes in such a system might be seen as reinforcing elements of human actions and behaviours. For instance, there is the potential of turning employees into zombie-like beings in the place of work and the same translates outside the place of work. While this may result in improvements in performance at work it may be counterproductive in other aspects including the applications in social relations (Kim 2015). So long as gamification has the potential of making employees less human, then it will consistently be criticized on ethical grounds.

Confidentiality and privacy is another concern with applying gamification technologies in the workplace. Performance monitoring and surveillance can affect individual privacy in a gamified application. Moreover, another impact of such technology can be seen in workers' autonomy and over control their own choices and interests e.g. nature of working style or time to perform a task. In addition, workers might concern about the information created and generated which can be used for purposes other than for which it was created (Thorpe et al. 2017). Any such breach of confidentiality and privacy would greatly impact the organization including threatening the performance of the organization. However, the potential impacts on the

employees are of the greatest concern given that the information can be a threat to mental and physical wellness of the employees if it gets to the wrong hands. It is, therefore, the responsibility of the organization to prevent the potential that confidentiality and privacy of information can be breached in the gamified working environment.

One of the primary problems identified in research of gamification strategies is the use of a one-size-fits-all approach to gamification. This approach to gamification has implications on the effectiveness of the games in that they may not be able to attain the desired results of the gamification strategy. Researchers have also indicated that one of the reasons for the one-size-fits-all approach to gamification is the lack of guiding frameworks and standards on how to approach needs-targeted gamification in business organizations and in different contexts of application. These findings assert the importance of research on the framework for agreeable and evolvable gamification in the business environment. In the rest of this literature review is a focus on some of the important factors of consideration when focusing on a gamification framework for effective gamification strategies in varied contexts of applications (Zuckerman and Gal-Oz 2014).

Gamification techniques and strategies are general goal-oriented. This means that the gamification techniques are generally designed to meet specified goals such as a greater focus on certain aspects of organizational and employee performance. Consequently, when studying the gamification techniques the most important aspect is ensuring that the goals of the gamification strategy are well defined in advance (Bellotti et al. 2019). A gamification approach can include a combination of targets. An organization can, therefore, focus on encouraging a variety of aspects in employee motivation (Simpson et al. 2015). In most cases, the focus of gamification was in generally focusing on all aspects of employee motivation. The strategy has been generally successful from the aspect of demonstrating the impact of gamification however; there have been challenges with this less focused approach to gamification and motivation in business organizations.

2.1.4   GAMIFICATION IN BUSINESS ENVIRONMENTS

This research has generally focused on gamification applications in the business environment with a major focus on application contexts of motivation and behaviour change. This is because available research and applied use of gamification have specifically focused on the two aspects of a business (Horita et al 2014). However, this analysis considers that there are wider business applications of gamification than just motivation, persuasion, and behaviour change (Fogg 2002b).

Business applications of gamification in the screening of potential employees for various positions are an increasingly recognized application of gamification (Nonaka 1994). In the past, organizations have struggled with the use of personality tests that involve a lot of self-reporting and the use of tests that many employees can revise for, copy, or get forms of support that make it difficult to correctly judge the capabilities and attitudes of the organization towards work. With gamification, it becomes possible to engage the potential employees in a highly simulated environment that involves aspects of learning about the personality and attitudes of potential employees. Gamification can also be used to measure the strengths of potential employees in numbers, problem-solving, and other important aspects that are critical when assessing candidates for positions in the organization (Algashami et al. 2018).

There are many unexplored possible applications of gamification in the business environment. Part of the areas bear the high potential of business development but have not been adequately explored include the use of gamification to develop and train employees in the organization (Bajdor and Dragolea 2011a). This would require games that are created for a purpose. The games would need to have a progressive structure in which the employees learn increasingly advanced concepts and gain increasingly advanced knowledge in specific areas of business. The approach would contribute greatly to mastery of skills, performance, and progress and as the employees learn through the gaming environment they would also feel the sense of accomplishment and achievement as they graduate across the levels of knowledge.

In general, the varied applications of gamification in the business environment should seek to combine the aspects of serious games, persuasion technologies, fun and entertainment, and pedagogical aspects (Fogg 2002b). In so doing the gamified personal development applications ensure that the employees are kept engaged by the fun and entertainment in the game, they are

kept motivated by the sense of achievements and success, and they keep on learning from the serious game environment applications. These properties lack in many ordinary training and development environments hence the hypothesis that such applications of gamification would greatly improve the way learning and development occur in organizations (Versteeg 2013).

The above business applications of gamification are hardly studied mainly because the technology, through recognised, has not yet gained critical mass adoption in business organizations. As an implication, the incentive to focus research on this research area has been generally lacking. Additionally, many practitioners and researchers have not yet identified the potential and opportunity for further developments in these highly advanced applications of gamification in the business environment. Focusing research on the standards and conceptual frameworks of gamification would help in shedding light on the variety of application areas of gamification in the business environment.

2.2   HUMAN MOTIVATION: THEORIES AND PRACTICES

Motivation refers to what makes people willing to desire, act or behave in certain manners. Organisations are using motivation to increase the productivity, performance and motivation of their employee. It has been studied in various domains including education (Simões et al. 2013), business management (Herzig et al. 2017), psychology (E. N. Webb 2013) and healthcare (King et al. 2013). A motive is a crucial element that increases people's willingness to achieve a goal or desired behaviour (Pardee 1929). One of the most successful ways to increase employees' work performance is to recognise positive behaviours and reward employees to make them feel valued and appreciated. In this part, various human motivation theories concepts will be discussed. The selection of the theories were based on their connotation to the gamification attributes. Moreover, the theories were meant to discuss the human needs in order to pave the way toward understanding the effects that gamification system might introduces to these human needs. The follow **Table 2** summarises the theories and their main attributes with the relation to gamification.

TABLE 2: THEIORIES VS. GAMIFICTION

Theory	Attribute	Relation to Gamification
Need Theory	Basic needs, Secondary needs	demonstrates the pathways towards the attainment of both the basic and secondary needs (Susi et al. 2007)
Maslow hierarchy of needs	Physiological needs, Safety needs, Social needs, Esteem needs, Self-actualisation needs	This theory of motivation can be incorporated into gamification for the demonstration of how the employees earn higher pay and benefits, titles, and opportunities for growth thereby meeting not just the physiological and safety needs but also the self-actualisation needs at the top of the pyramid (Miner 2015)
ERG theory	Existence, Relatedness, Growth	The ERG theory identifies that people might be different in their individual needs (Alderfer 1969). Also to satisfy people motivation there are no specific orders of needs
Herzberg hygiene-motivation theory	Motivators factors Hygiene factors	Motivators factors concerns to support employees' satisfaction in terms of recognition, responsibility and achievement. The hygiene factors are representing the first set of needs in which they can lead to job dissatisfaction such as work conditions, policies, rules and salary.
Cialdini's theory of influence	Reciprocity, Commitment, Social proof, Liking, Scarcity	These principles provide a psychological understanding of persuasion (Cialdini 1987). In gamification system the persuasion element might be utilised to motivate people toward certain goals

2.2.1 NEED THEORIES

Need theories categorize human desires into two distinct groups which include basic needs and wants. Basic needs are also referred to as primary needs. They include the need for food, shelter, and clothing. Basic needs are those elements that are required to sustain life. All the other needs, apart from the basic ones, are considered as wants or secondary needs. They are not necessary

for the sustenance of life but are important in ensuring that life is comfortable (Nixon 2004). While basic needs are common to all persons, the secondary needs vary from one person to the other and depend on a variety of factors including an individual's income. Secondary needs, on the other hand, are unlimited (Miner 2015). The general need theory is essential in demonstrating the primary and secondary needs which are essential factors of motivation. Besides, separating the basic from secondary wants, the theory fails to present ordered categories of secondary needs and the role they play in motivation.

In its application to gamification, the needs theory demonstrates the pathways towards the attainment of both the basic and secondary needs (Susi et al. 2007). While all employees in an organization may be able to achieve the basic needs, gamification can be used to demonstrate how they can achieve nearly unlimited access to the secondary needs by demonstrating mechanisms of earning higher rewards. The Follow sections are discussing three well-known needs theories; Maslow hierarchy of human needs, ERG theory and Herzberg's hygiene-motivation theory.

2.2.1.1   MASLOW HIERARCHY OF HUMAN NEEDS

Abraham Maslow's needs theory is an advancement of the general needs theory (Johnson et al. 2018). Abraham Maslow determined that the general needs theory identified the basic needs and the wants (Miner 2015). Maslow's hierarchy of needs as a theory of motivation indicates the needs that individuals need to fulfil beginning with the physiological or survival needs (Johnson et al. 2018). Beyond the survival needs the theory includes social needs, then esteem and self-actualization needs. Under this theory, the organization motivates the employees by offering attractive pay, benefits, and job security (Miner 2015). The organization also motivates the employees by offering attractive titles and opportunities for growth thereby addressing the employees' needs with respect to self-esteem and self-actualization.

Gamification is one of the main techniques which can be used to support people's needs for recognition. For example, a work department can use a leader-board to demonstrate employees' progress to the whole department employees. This theory of motivation can be incorporated into gamification for the demonstration of how the employees earn higher pay and benefits, titles,

and opportunities for growth thereby meeting not just the physiological and safety needs but also the self-actualisation needs at the top of the pyramid (Miner 2015). In gamification, the organization is also able to learn about the factors that motivate generally all the employees in the organization. Consequently, the organization can go forward and put in place mechanisms of motivating each of the employees. Consistent with Maslow's hierarchy of needs which demonstrates that the employees pursue different needs even when at the same career level, Gamification can be used in learning the factors that motivate the employees and the organization goes forth to put in place such measures for the employees thereby creating a motivated workforce (Johnson et al. 2018).
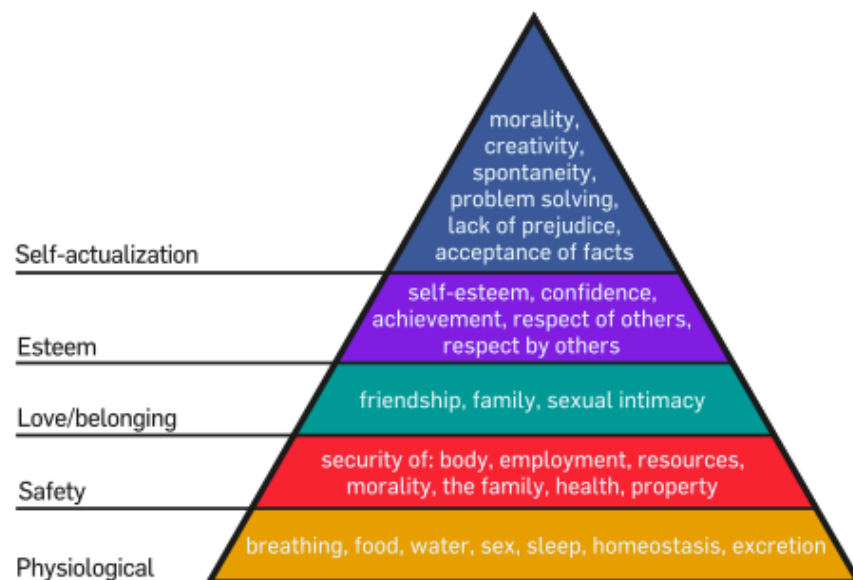
FIGURE 4: MASLOW'S HIERARCHY OF NEEDS THEORY (MINER 2015)

2.2.1.2 ERG THEORY

ERG theory is a modification of Maslow's hierarchy of needs theory (Alderfer 1969). However, the theory claims that the human needs for satisfaction and motivation are more than what the Maslow theory described. Three main pillars shape this theory: *Existence*, *Relatedness* and *Growth* (Alderfer 1969). Existence focuses on providing the basic human requirements which include physiological and safety needs. Relatedness need refers to people's social needs such as acceptance and belongingness. Growth is related more to people's desire for self-actualisation, self-fulfilment and personal development. ERG theory combines Maslow physiological and

safety needs into the existing part. Relatedness can be linked to Maslow's esteem needs. The growth is a map to self-actualisation and self-esteem needs in Maslow's hierarchy of needs.

Alderfer (1969) argued that social and psychological needs can be needed for some people at the same time. Thus, to satisfy such people there are no specific orders of needs. In contrast to Maselow' theory, The ERG theory identifies that people might be different in their individual needs (Alderfer 1969). In addition, the ERG theory does not classify the human need with specific orders. Although this theory has gained some recognition in the literature of motivation there is some lack of clarity in relation to for example the measurements of the three pillars of needs.
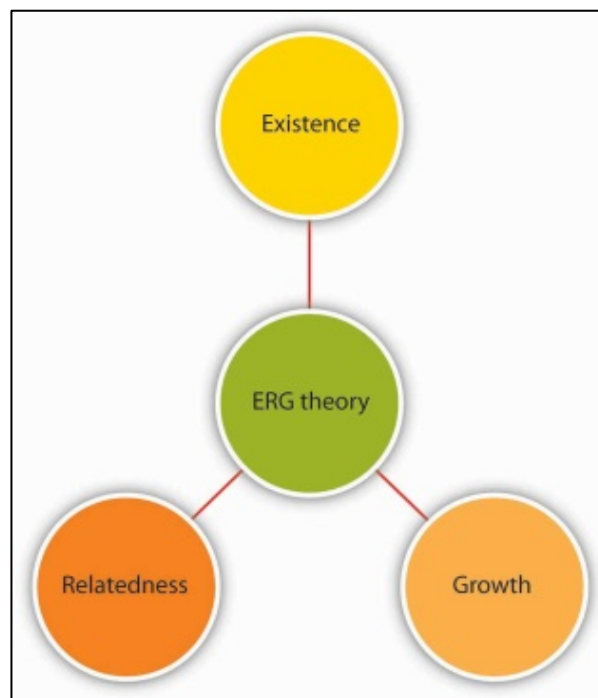
FIGURE 5: ERG THEORY (ALDERFER 1969)

2.2.1.3   *HERZBERG HYGIENE-MOTIVATION THEORY*

Herzberg's hygiene-motivation theory is one of the psychologist theories focusing on what in the job environment relates to people motivation. Herzberg summarised that people have two sets of needs (i) Lower set of needs as an animal to avoid pain (ii) the second set of needs are the higher level of needs which he described as a human being to grow psychologically (Pardee 1990). In the workplace, some factors are only connected to the first set of needs and while others are related to the second.

The theory has two main factors: *Motivators* which related to the second set of factors. This can support employees' satisfaction in terms of recognition, responsibility and achievement. The second factor is the *hygiene factors*. Those factors are representing the first set of needs in which they can lead to job dissatisfaction such as work conditions, policies, rules and salary. Although this theory has distinguished between the two main factors (the motivators and the hygiene), the theory has some limitations in relation to oversimplifying people job satisfaction (Shipley et al. 1986).

2.2.2   CIALDINI THEORY OF INFLUENCE

Cialdini's theory of influence listed six main principles influence behaviour. These principles provide a psychological understanding of persuasion (Cialdini 1984). In gamification system the persuasion element might be utilised to motivate people toward certain goals:

- **Reciprocity:** People tend to repay what others provide them with e.g. behaviour, services, and gifts. For example, in social media applications like Facebook, people usually 'like' other people's posts when those people have previously done the same to their posts.

- **Commitment and consistency**: People are most likely to adhere to their commitments e.g. ideas, goals. This helps to persuade people to do certain actions; e.g. following certain rules in the workplace.

- **Social proof**: People are likely to be motivated to follow what others have done. Although this principle could help to influence people to adopt the targeted behaviour, it might cause side-effects; e.g. when bad behaviour is copied by a group of workers.

- **Authority**: Authority is a way of gaining truthfulness. People tend to be able to perform actions when they are provided with enough information from a recognised authority. Experts in a field can be a good example of recognised authority. However, it is worthwhile understanding whether experts might benefit from compliance before acting as they advise.

- **Liking**: People can be persuaded by people they like and respect including parents, relatives, friends and celebrities. Managers can persuade employees to accept their requests when they build a friendly environment in the workplace.

- **Scarcity:** People are assumed to be more motivated to take decisions or actions because of a potential loss of opportunity rather than by potentially gaining something. However, the scarcity influence technique may create ethical issues. For example, some flight companies advertise a limited number of seats at a good price to persuade people to take hurried decisions while the next level of prices is not significantly different.

2.2.3   PANOPTICON

Panopticon is based on motivating by enforcing. The Panopticon ("all-seeing" in Greek) is a model proposed by Bentham in 1791 to allow institutions to observe people using a single observer (Brignall 2002). The idea of the panopticon design is to produce an architecture algorithm that can be used to design prisons, schools, cities and factories to enhance social control (Brignall 2002). The concept of the design is similar to the surveillance technique in Fogg's eight principles of persuasive technology.

The main purpose of the panopticon is to monitor individuals' behaviour and assess them, thereby reducing undesirable behaviours. Panopticon is a widely used concept in various disciplines. O'Meara (2011) compared the panopticon in prison with the academic rewarding system whereby faculty members are encouraged with constant observation. Campbell and Carlson (2002) explored the use of technology in online panopticons in order to increase the efficiency of advertisements. They also mentioned that users of the web are effectively participating in an online panopticon without informed consent. The gamification systems embedded with the monitoring and surveillance techniques to motivated people, so understanding the panopticon practise of such elements will enrich the understanding of the side-effects they may introduce to the work environment.

2.2.4   SELF DETERMINATION THEORY (SDT)

Ryan and Deci (2000a) defined human motivation as "to be more to do something". They added that motivation can be different from one to another. Thus, motivation is always subject to each person. Therefore, Ryan and Deci (2000b, 2000a) and Ryan et al. (2006) distinguished between different type of motivation based on different intentions and goals that guided the actions. The major distinction is between intrinsic and extrinsic motivation. The intrinsic motivation is to be motivated to do something for its own enjoyment. However, the external motivation is guided from external sources or benefits, e.g. rewards and incentives. Ryan and Deci (2000b) defined three main psychological needs which persuade self-motivation to enhance well-being and mental health. *Competence*, *relatedness* and *autonomy* are the three essential needs that can allow growth and satisfaction.

- Competence: concerns with the abilities and experiences of mastery.

- Relatedness: being related to others and socially connected to the environment. This is a key master feature gamification in teamwork should caring for and not affecting the work nature and relations.

- Autonomy: people tend to be motivated more with abilities to have control over life. The control to decide over choices without force and with being able to do what is preferable with ones' own values. In gamification the level of autonomy should be carefully embedded with such systems and not over controlling people behaviours and choices.

2.2.5   SELF-REGULATION THEORY (SRT)

Self-regulation theory is about controlling your effort, though, actions to successfully match what you have planned to be. It greatly helps to be flexible to adjust actions and behaviours to remarkably achieve social and situational demands. Self-regulation could help in many situations in group work especially when conflicts of motivations exist. Baumeister et al (1996) suggested four main components of self-regulation theory:

- **Standards**: clear and well-defined standers towards preferable actions or behaviour. Effective self-regulation theory required well established and governed standard. Ambiguity and lack of clarity in standards negatively affecting the self-regulation.

- **Monitoring**: to regulate behaviour there should be a sort of observation and tracking. The feedback is one aspect where a person can truck self-contribution and comparing it to a standard. This will assist to achieve test the progress toward desirable goals.

- **Willpower:** Regulating the self-required internal strength to provide a power to change the self and control the urges.

- **Motivation**: which is the focus of this thesis means the desires to meet standards or achieve a goal. Even with integrated monitoring and standards goals cannot be achieved without motivation and caring about meeting the goals. The gamification system plays the main role in regulating people motivations toward achieving goals.

2.3   GROUP DYNAMICS

Group dynamics refers to behaviours, actions and processes that occur within or between social groups (Forsyth 1992). The focus of studying group dynamics in this section is in relation to aspects that are related to the use of gamification in team workplaces such as group cohesion, group performance and conflict.

- **Group cohesion**: Refers to the concept of being connected in one group to perform tasks or certain goals (Dion 2000). The success of group cohesion is a key element in group motivation for increasing team members' performance towards targeted goals. In gamification, the design of the system should be concerned about not affecting the cohesion of the group, which would help to prevent any possible side-effects between group members such as, social loafing and sabotage.

- **Performance:** Group performance is highly connected to group cohesion because better group cohesion leads to better group performance and better group cohesion increases group performance. Social loafing and free riding are the main issues that might occur in teamwork with regards to performance. Social loafing refers to the phenomenon of individuals spending less effort on group tasks compared to when they work alone (Latané et al. 1979). Freeriding is when the contribution of individuals is less in a collaborative task due to a feeling that others can compensate for their lack of effort (Dion 2000). In DM, performance is the main criteria to monitor user engagement in a

task in order to achieve goals. However, disclosing users' performance might have potential side-effects and create conflicts among group members. For instance, it might cluster group members into top performance users and low performance users. This research will study the effect of disclosing users' performance and how it should be designed to increase the efficiency of the gamification system.

- **Conflict**: Conflict occurs in a group as a result of unacceptable actions or behaviours. Intergroup conflict occurs between two or more groups while intragroup conflict exists within a group (Forsyth 1992). Three main types of relations occur between group members. Independence, in which the success or fail of each person in the group unrelated to others. Collaboration, where the success of individuals reflects on the success of other group members. Competition, in which the success of individuals in the group depends on performing better than others (Deutsch 1949). While the competition relation increases the potential for conflict, some situations (e.g. free riding, social loafing) in collaboration relation might cause conflict. Collaboration and competition are part and parcel of different gamification systems. The next chapter explores various strategies to manage the side-effects of gamification on teamwork.

2.4   MOTIVATION TECHNIQUES AND DIGITAL MOTIVATION

In a fast-paced organization, keeping employees motivated is in itself an art of management (Hamari et al. 2014). The rationale is that every employee is motivated by factors that are significantly different from those that motivate other people. An employee who is motivated by recognition in the organization is different from an employee who is motivated by the simple act of making an impact on a specified social group in the organization or even outside the organization. The implications are that an organization needs to focus on understanding factors that motivate the employees and offering platforms for keeping the employees motivated. This takes a personalized mechanism of providing feedback, recognizing, and rewarding employees. A personalized motivation technique is only possible in a technology-driven motivation environment that incorporates the use of big data in order to keep employees of an organization highly motivated (Johnson et al. 2018).

There are different techniques for motivating employees (Marache-Francisco and Brangier, 2013). The most common motivation techniques include letting the employees know that the employer trusts and appreciates them. The motivation techniques also include giving the employees a purpose, setting smaller weekly goals, and motivating individuals rather than motivating teams. In addition, the motivation techniques include having an open-door policy in which feedback is provided promptly and directly to the specific employees, creating motivation and recognition rituals such as having an employee of the week, the employee of the month, and employee of the year (Johnson et al. 2018). In whole, motivation techniques for organizations entail ensuring that the employees see and understand the big picture on the performance of the organization while at the same time ensuring that things that matter most to them are addressed in accordance with the theories of motivation.

The motivation techniques can be embedded within digital platforms in order to increase the effectiveness to achieve the goals through the real-time control and online observation facilities. Digital motivation refers to the use of technical solutions to increase people desire toward achieving certain goals or changing behaviours (Lister et al. 2014). The factors which increase people desire to follow certain behaviours or to achieve goals is called "motive" (Fremont and Renzweig, 1988).

The motivation techniques captured in the paragraph above provide an appreciation of some of the most important elements of motivating employees. The above-mentioned factors can, however, be addressed nearly holistically through the implementation of a digital motivation strategy such as gamification. With gamification, it is possible to make an observation on variables such as individual performance as compared to team performance. In the following sub-sections, the discussions will be on some well-known paradigms which are utilising the digital-based motivation techniques such as Gamification, Game with Purpose and Persuasive Technology.

2.4.1   PERSUASIVE TECHNOLOGY

Persuasive technology refers to the use of technology to convince humans to change their targeted behaviour using persuasion techniques and social influence (Fogg 2002b). Fogg

identifies three principles in the Fogg Behaviour Model (FBM) as main principles for human persuasion; motivation, ability and effective triggers (see **Figure 5**). The model shows that to achieve a targeted behaviour, a person should have the motivation, a level of ability and an effective trigger. Ability and motivation have the influence to increase the possibility of achieving desired goals. This means that when the person is highly motivated to perform a task but has limited ability, the chance of success will be low (e.g. writing an article about the government's ways of spending the budget with limited access to the necessary information). Similarly, when a person has the ability to do a task but they lack motivation, the chance of achieving the goal will be low (e.g. a person stopping smoking while feeling content about their smoking habit). Therefore, the possibility of achieving a goal is maximised when you have high levels of both ability and motivation. The third principle of the FBM is a trigger. Moreover, with high motivation and ability but without a trigger behaviour will not occur. A trigger can be a reminder or a text message etc. (Fogg 2002b).
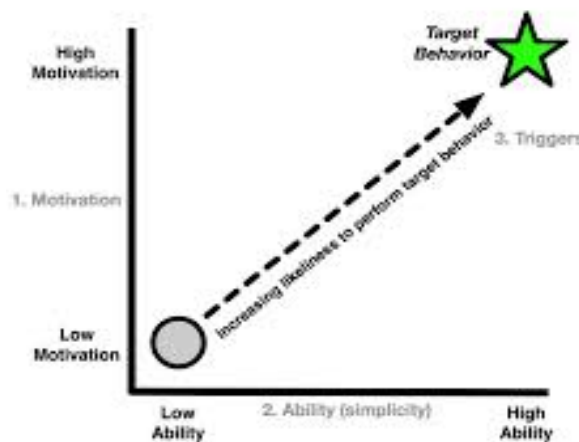
FIGURE 6: FOGG BEHAVIOUR MODEL (FOGG 2002A)

Fogg (2002a) defined a persuasive technology tool as using technology products to change behaviours or attitudes or both by simplifying a desired goal. He classifies seven types of persuasive technology tools:

Reduction

The main principle of reduction techniques is to use computer facilities to minimise complexity towards targeted behaviours. For example, in marketing web-sites make the persuasion process

in just one-click. This can help to increase people's self-efficacy and simplify goal achievement for individuals.

Tunnelling

In this persuasive technique, computers persuade users to achieve a target goal by guiding them through clear actions or steps. For example, in gamification a progress bar is a clear example of tunnelling persuasion because it helps users to perform a task by showing them the amount of effort required to complete the task. In tunnelling, users who lack self-determination can follow designed steps to finish a task or achieve a goal or behaviours. A good example of tunnelling is the steps users follow to download new software or to register on a website. Although tunnelling techniques would help designers to make users follow their designed process and act as they prefer, this might create some ethical issues; e.g. asking for details without any prior consent or having a lack of information about the reason behind a certain step.

Tailoring

Tailoring techniques persuade users to perform a task by customising the design or choices to their interests. For example, on some online shopping websites, users are asked to enter their preferences with regards to colours, brands or prices, with suggestions given to them based on their interests. Despite the ability to embed tailoring techniques in a wide range of persuasive technology products, it might present some ethical concerns; e.g. users might not have enough information about how their personal details will be used. Also, they might not understand why they have been given certain suggestions.

Suggestion

Suggestion techniques are based on suggestive behaviour at the most appropriate moment. An example of a product using suggestion techniques is the navigation device. This provides alternative directions immediately when an accident occurs on the way to your destination. gamification uses suggestion techniques to motivate users to perform a task by giving them feedbacks or suggestions based on the monitoring of their performance; e.g. leader-board technique.

Self-Monitoring

This technique is widely used in most technology products. It allows users to monitor their own performance in order to motivate them to achieve goals or to change attitudes. Most fitness applications depend on self-monitoring techniques to persuade users to do exercise or to lose weight. Some gamification elements rely on self-monitoring techniques to motivate users; e.g. a progress bar. Self-monitoring might raise ethical concerns, however. Users might be concerned about how they are being measured and the reasons behind comments or feedback they might receive.

Surveillance

In surveillance, users are observed by others. It can persuade users to act in an appropriate way or to change behaviours by monitoring them. Surveillance techniques are widely used in markets for many purposes; e.g. a parent can monitor their teenager's driving, companies can track their workers etc. gamification heavily relies on surveillance techniques. Leader-board, badges, points and other examples of gamification are based on the observation of user performance. Despite its effectiveness in persuading users, there might be ethical concerns. Users might have issues regarding their privacy. Moreover, they might have no choice regarding how they are observed and who can access their information.

Conditioning

Conditioning techniques reinforce users to perform target behaviours by using "operant conditioning". Conditioning could be similar to the reward system in gamification; in order to receive a reward a specific task should be implemented.

Fogg (2002a) proposed the term Captology which is refers to the acronym: Computers as Persuasive Technology (CAPT). Captology is the defining concept that makes persuasion technologies an important element in everyday life technologies. By definition, captology refers to the output of the interaction between persuasion and digital technologies. The term captology deeply describes the process through which persuasion technologies capture the mind of people thereby resulting in some form of behaviour change. An example of captology is demonstrated in the increased use of social media (Sanchez-Gordón et al. 2016). Through targeted links and information, social media is able to supply the users with unlimited information on particular subjects or topics thereby making it highly persuasive.

The concerns about the ethics and morality of the technologies point specifically to the need for a strong framework in which technologies based on persuasion like gamification technologies can adapt. This requires intensive and extensive research on the technologies, the development processes, the applications, and the implications on the human subjects for which they are intended (Kirillov et al. 2016). These aspects are critical for the software engineering industry considering that it is also a potential target of the technologies discussed in this research thereby providing for the need to critically assess these technologies.

An important aspect that is consistently highlighted in research studies is the need to ensure that the success of these technologies does not blind the potential for misuse of the technologies especially when there are no regulations, standards, or specific frameworks for the adoption of the technologies (Kapp 2013). When discussing the usefulness of the technologies it is therefore important to consistently refer to the discourse on ethics and morality of the technologies as well as the possible pathways of creating standards and conceptual frameworks for the operations of persuasion technologies and gamification technologies considering they are interrelated for application purposes (Uskov and Sekar 2019).

2.4.2   SERIOUS GAMES

The term serious game is gaining a high recognition in the literature and become a popular term in recent days. However, there is not a current singleton definition for its concept (Susi et al. 2007). Michael and Chen (2006) defined serious games as "*games that do not have entertainment, enjoyment, or fun as their primary purpose*". Another term which designed to meet all "sufficient conditions for being a game" (Xu, 2011) is serious games. Serious games is sharing with gamification the fact that both are used for purposes more than entertainment (Deterding et al. 2011).

Serious games are increasingly common in different fields of application such as advertising, learning, stimulation and training (Susi et al. 2007). In the capital markets, for instance, learners are trained through actual serious games in the sense that the learners are provided with virtual trading accounts, virtual trading capital, and a virtual trading board on which they can virtually purchase real assets using real market information and in the end they are rated based on the

returns that they make (Bellotti et al. 2013). Corti (2006) emphasised that serious games are all about using digital games to engage end-users to achieve specific goals e.g. develop new knowledge or improve skills. Also, the serious games applications are in areas like education, healthcare and military governments (Susi et al. 2007). Although serious games might be not a good case for all learning outcome (van Eck 2006), it is an effective approach for engaging users in experiences which is impossible in the real world such as to do unsafe, costly experiments (Susi et al. 2007).

Designing serious games is a complex and involving process. The process can also be highly expensive, especially when bespoke products are required (Orji et al. 2018) . Additionally, designing of serious games is a process that faces challenges of ethical and moral considerations especially when designed specifically for an organization that has to determine the desired outcomes of the game. The common problem between gamification and serious games is the lack of standards and a conceptual framework guiding the development of the games yet there are many outstanding ethical questions and considerations with respect to the two technologies (Xu et al. 2017). This means that the technologies can be potentially abused without recourse for the developers of the game. To address the challenges there needs to be a strong focus on how to standardise both gamification and serious games (Tondello et al. 2017).

2.5 SOCIO-TECHNICAL SYSTEMS

Socio-technical systems (STSs) involve interactions between people, technology and environmental aspects (Baxter and Sommerville 2011). The purpose of STS methods is to build a system with a consideration of the context, stakeholders' requirements and the goals of the system together with the interaction between them. This can be achieved by people participating in the design process of the system. Mumfords's ETHICS is a participatory approach for STS design that aims to design systems that are humanistic, friendly and effective (Mumford 1993). Baxter and Sommerville (2011) identified several approaches for STSs such as the soft system methodology (SSM), ethnographic workplace analysis and human-centred design. In STSs one of the main challenges is to purpose an effective interaction between actors to achieve the desired objectives (Dalpiaz et al. 2013). In the early stages of the design of STSs it is essential

to consider how the system will meet the organisational and stakeholders' goals. The goal model (a technique in requirement engineering) can be used to illustrate the rationale of humans and software systems and to clarify stakeholders' requirements and goals.

Goal modelling is a widely used technique in requirements engineering (RE). It refers to a number of processes aim to define stakeholders and their requirements (Nuseibeh and Easterbrook 2000). Authors have introduced goals into RE for many reasons and to achieve a variety of objectives. Ali et al. (2010) introduce contextual goal models which stem from the fact that context can have a major influence on users' goals. Goal modelling is useful in the early stages of the design process of a system to consider the organisation and stakeholder goals and requirements (Yu 1997). In general, RE offering concepts which can be modelled using goal modelling notions like actors and social dependencies amongst them such as goals, soft-goals, tasks and resources (Castro et al. 2002). Two types of requirements exist function requirements (FR) which concern the services that the system can provide and non-function requirements (NFR) which specify the quality of the system (Lapouchnian 2005). Yu and Mylopoulos (1998) specify the benefits of goal modelling in RE:

- Requirement Acquisition: Goals could help in the elicitation and elaboration process of stakeholders' requirements.

- Relating requirements to their context: goals are an important element that can help to investigate the relationship between a system and the context.

- Clarifying requirements: especially in NFR; e.g. flexibility, reusability and maintainability. Identifying goals helps to specify requirements and reduce the chance of missing important requirements.

- Dealing with conflicts: goal concepts widely used to deal with various types of conflicts. For instance, different views of stakeholders might lead to conflict in terms of requirements. Goals can help to make decisions about certain elements that might cause conflicts such as costs, security and performance.

- Driving Design: goal concepts play an essential role in connecting requirements to design.

In the context of transparency in DM, transparency seems to be between social-technical actors or their representatives. Goal modelling would help to provide a clear understanding of stakeholders' goals with regards to motivation which would help to achieve stakeholders' goals. Moreover, goal modelling could offer opportunities to identify conflicts that might occur between stakeholders' goals which would help to make alternative decisions. For example, a user's main goal is to be motivated by earning more money while the main goal for the organisation is to limit their annual budget to a minimum. DMML is a modelling language (Shahri et al. 2019) which takes goal modelling as a baseline. The next section explains DMML in details.

2.5.2   DMML: DIGITAL MOTIVATION MODELLING LANGUAGE

DMML (Digital Motivation Modelling Language) is a modelling language using goal modelling as a baseline in order to model motivation requirements in business information systems (BIS) Shahri et al. (2019). The aim of DMML is to engineer motivation requirements in BIS align with its goals and environments. An example of a model using DMML is shown in **Figure 6**. DMML consists of two main parts; BIS environment and the motive being implemented into the environment.

- **Environment**: it is an essential part of the engineering of motivation in BIS. The environment consists of several components and their relations which describe the environment.

  - *Actors*, refers to the position people can fulfil to implement tasks in order to satisfy certain goals. Actors are the main component to shape the organisation structure.

  - *Value*, describe the main environmental and cultural values in the organisation. Values play the main role in users' satisfaction and better performance toward certain goals. The design of gamification should align with the organisation values to not create any side-effects.

- **Tasks,** the actions toward fulfilling specific goals. Three main aspects included in the task to describe the motive which can be added to the environment; measurability of the outcome, subjectivity to human interpretation and quality orientation which describe whether the task is quality based or quantity.

- **Agent,** is the actual person who fulfils the actor position in order to perform certain tasks to achieve personal or organisational goals.

- **Motives:** this part of the DMML concern about increasing the motivation of people toward certain goals which are divided into three parts**.**

  - **Reward,** describe the element that been added to the BIS to motivate people to perform a task. It consists of four main perspectives, policy, element, nature and strategy.

  - **Capture information,** refers to the information been captured from the environment. It is one of the main elements agents might concern about, who can have the ability to access their information (managers, peers, everyone).

  - **Technique,** refers to the technique been used to motivate people. Fogg (2002a) proposed seven main techniques- explained in **Section 3.2.3** to persuade people toward a certain task or behaviours.

This research will utilise DMML as a modelling language to model the organisation in order to provide a visual representation of the proposed design and stimulate the risk identification process.
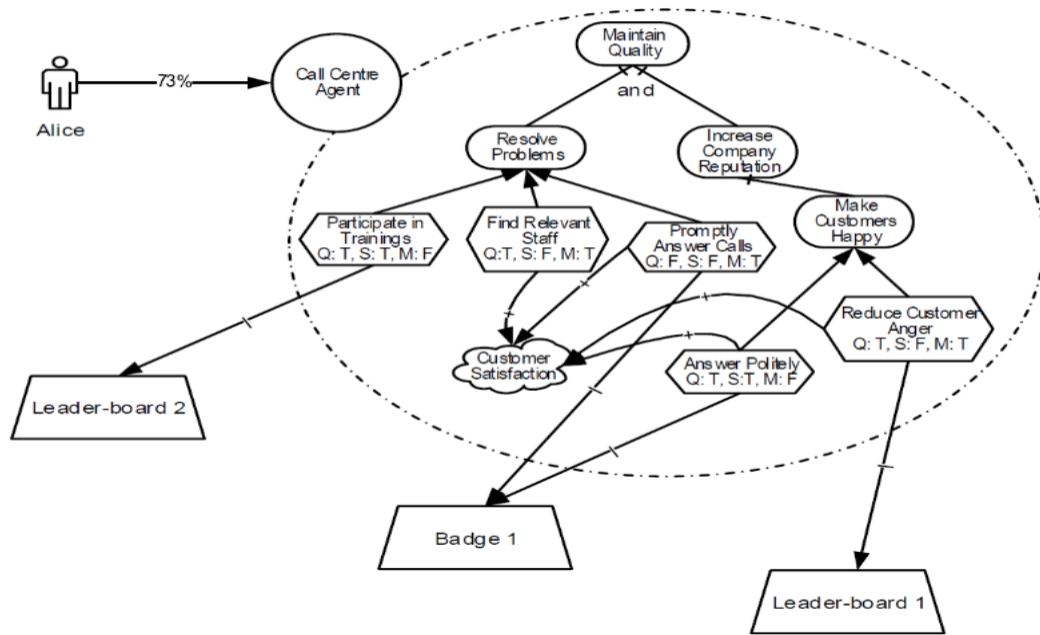
FIGURE 7: EXAMPLE OF DMML FOR CALL CENTER SHAHRI ET AL. (2019)

2.6 RISK MANAGEMENT IN SOFTWARE DEVELOPMENT PROJECTS

Risk defined as "future conditions or circumstances that exist outside of the control of the project team that will have an adverse impact on the project if they occur (Dey et al. 2007). Barata, et al. (2015b) provided what a definition for risk includes (i) when the expected outcome of an event differs from the real outcome and (ii) the impact that is connected with the outcome. Furthermore, the risk is gained more attention in information system researches for example, in business process management (BPM) and enterprise modelling (Barata et al. 2015a). However, as it is mentioned in (Suriadi et al. 2014) that "*there is still a lack of research which investigates the management of risks during process execution*".

Dey et al. (2007) emphasised that "there is a lack of management of software development even by leading software developers". The authors claim that "*Although researchers and professional have written on risk management in software development very little work has been done in order to involve all the concerned stakeholders in managing risk and integrating the risk management process with a holistic project management approach (software development cycle)*". Successful software design is that can identify potential risks and try to manage them before and after they occur (Dey et al. 2007). This section will review the literature in relation to

the risk management approaches in software development projects. The aim of this section is to provide a background on the used methods and frameworks for risk management.

2.6.1   RISK MANAGEMENT STAGES

The literature has discussed different stages of the risk management process. In (Guiling and Xiaojuan 2011, Avdoshin and Pesotskaya 2019) the mentioned that most of the methods of risk management divided into *risk identification, risk analysis, risk planning or mitigation, risk monitoring and control*. Boehm (1991) classified the risk management process into *risk identification, analysis, prioritisation* and *control*. Williams (1995) provided a review of the researches on risk management. The author discussed various risk management specifically the work focus on risk identification and the tools that are applied for such purpose. In (Keshlaf and Hashim 2019) a risk management method called SoftRisk proposed with three stages risk *identification, assessment* and *control*. Two methods in the literature PRORISK (Suebkuna and Ramingwong 2011) and PRM (Linda 2011) discussing the risk management process from two stages the *risk assessment* and *risk control*. Roy and Dasgupta (2015) have discussed the well-known risk management methods in the literature and summarised them a table (see **Table 3)**.

In Schmidt et al. (2001) the authors emphasised on the need to study and understand risk factors as they argued that the literature is still inadequate. Moreover, they summarised the risk management process from the project management literature views in two main stages: *assessing* risks which including the identification of the risk factors and the likelihood to occur and the *second* stage is to take action to control the risk (mitigation process).

The ISO 31000 Standard is an international and widely accepted standard for effective risk management presented by the IOS Technical Management Based Working Group on risk management (International Organisation for Scandalisation, 2009). The stander consists of eleven risk management principles. The standard suggested that the implementation of the eleven principles will lead to effective risk management. **Figure 8** shows the relationship between the principles for risk management, the framework and the risk management process for the ISO 31000.
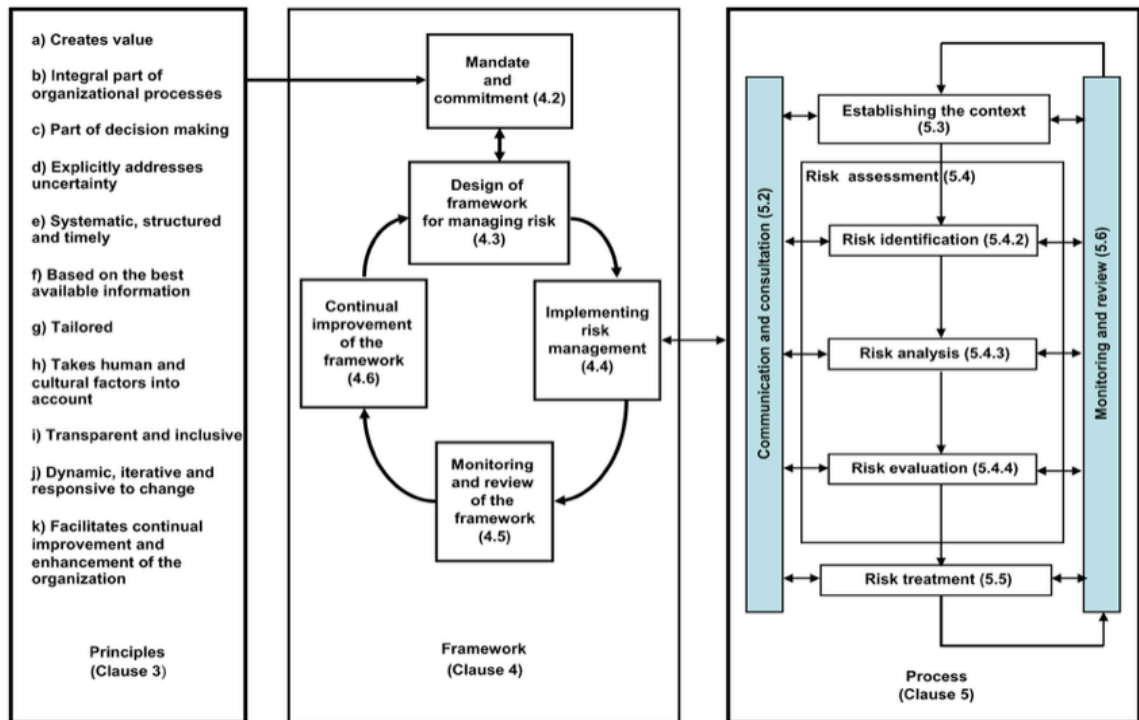
FIGURE 8: ISO3000 RISK MANAGEMENT STANDARD (INTERNATIONAL ORGANISATION FOR SCANDALISATION, 2009).

TABLE 3: SUMMARY OF THE RISK MANAGEMENT METHODS ROY AND DASGUPTA (2015)

SN	Methods/ Models/ Proposed	Observations
1	BOEHM	Does not handle generic risk; works on risk analysis paradigm principle.
2	SEI-SRE	Generates a template-based design that results inconclusive outcomes due to less scope for modification.
3	RISKIT	Does not collaborate risk estimation and risk metrics, thus reducing the prediction possibilities of potential risks.
4	SERUM	As it performs a continuous evaluation of risks, hence time management holds the key role as risk element in the project.
5	SERIM	Good for small organizations; handles multiple projects for analyzing software risks; lacks explicit guidelines on using information to identify possible risks in the project.
6	SRAM	Risk ranking is done by AHP and entropy method. It does not handle marketing risk.
7	Agle et al.	Handles team structure; does not consider funding and resources
8	Danny	Performs classification of risk by quantitative analysis; aims at saving

		resources.
9	Armestrong	Identifies the risk exposure areas and prioritizes them in respect to business context.
10	H. Rashidi	Perform risk classification and risk indexing.
11	SRAEM	Risk prioritization and ranking is computed by MCRSRM, decision through quantitative assessment; model focuses on external risks related to the requirement analysis.
12	SRAEP	Model uses SFTA to identify and analyses the risk and RRL for risk measurement; follows models based approach.
13	SPRMQ	Well suited for handling the product risk; does not consider external risks such as marketing risk, organizational risk, etc; uses avoidance, minimization and contingencies strategies
14	RIMAM	Works on the principle of "*handling and avoidance mechanism*"; some of the risk can be handled locally
15	TRM	Follows all the steps of SEI; handles new risks and risk status are communicated to all individuals.
16	SoftRisk	Documents all types of risks; performs qualitative and quantitative analysis; Consider new risks in an iterative process
17	ARMOR	Identifies source of risk and suggests solution to reduce risk levels; uses regression analysis to validate generated risk model
18	RAT	Performs hybrid assessment of risks in five phases; risks are ranked based on ranking matrix.
19	ERM	Evaluates level of an organization to propose risk assessment tool using graphical decision trees and quantitative analysis
20	PRORISK	Links project and risk management towards developing a risk database; handles six types of risks for software projects.
21	RMM	Provides the bench mark to an organization to assess its maturity level in terms of project risk management.
22	PRM	Works on the assumption that risks are independent which may lead to incorrect risk assessment.

In this thesis, the for the management of gamification risks in teamwork business environment the focus is going to be on proposing a gamification risk management method which followed the two most common risk management stages in the related literature as

mentioned earlier (i) the risk assessment focusing particularly on risk identification and (ii) risk management focusing mainly on the risk mitigation process.

2.6.2   CHECKLIST AS A RISK IDENTIFICATION TOOL

A checklist can be used as a risk identification technique which is commonly applied in the literature to identify software-related risks (Boehm 1991, Wallmüller 2002). Perry and Hayes (1985) suggested the use of a checklist for risk identification that might occur during the lifecycle. In (Schmidt et al. 2001) the focus was to propose a checklist based risk identification for software projects. The authors developed a Delphi survey to create a rank-order for risk factors. In addition, they argued that three main questions that can be used to develop an effective risk management approach (Schmidt et al. 2001):

- What are the risk factors the software project managers might face?

- Which risk factors do managers consider much?

- What are the countermeasures that can effectively help to mitigate the potential risks of given risk factors?

Moreover, As mentioned in (Boehm 1991) the checklist as a risk identification tool can be developed based on two aspects (i) identifying the main risk sources and (ii) through an iterative process with practitioners from related domains. He proposed a list of general risk factors with ten elements that might cause-effect in a software project. The checklist is designed to be used by the managers and system engineers to identify risks elements in software project design.

To sum up, although the literature has several methods for risk identifications process such as scenarios, brainstorming and examination of past situations, there is still lack of a good mechanism to help project managers for potential risk factors identifications (Schmidt et al. 2001). In addition, most of the proposed methods have issues which limited their validity for reasons like (i) most of the methods are expecting managers have the required level of experiences to be aware of the problem, (ii) time-consuming and costly to be used on a regular basis (Schmidt et al. 2001).

As risk identification, this thesis will utilise the checklist risk identification tool for the risk assessment process which is going to be tailored for gamification system and taking in account

the intensive human factors and social and organizational culture of such system. The checklist tool is meant to be able to use by managers together with system analysts and end-users.

2.7 SUMMARY

This chapter provided a review of the state of the art of the thesis main topic which is the gamification as a motivation mechanism for a teamwork business environment. The review also covered related topics focusing on frameworks and approaches for such a system. In addition, a particular focus of this chapter was in the methods and approaches for the risk management of software projects. The chapter assists to develop an initial template of gamification risks and risk factors which is meant to be a starting point for the investigation research in **Chapter 4.** In the following chapter, the discussion is going to be around the methodology approach followed for this thesis.

3. CHAPTER 3: RESEARCH METHODOLOGY

This chapter will discuss the thesis methodology approach and the justifications of the research methods followed. The analysis and interpretation of the data collected will also be examined. Firstly, this chapter will introduce both the research methodology approaches and the general research methods implemented. The research approaches are the board terms that describe the research steps and processes, including the data collection methods, analysis and interpretation (Creswell 2014). Two main scientific research approaches were used: the deductive and inductive research approaches; see **Figure 8**. The deductive research approach generally refers to the move from the general and ends with the specific. It requires an understanding of the research theories before starting the research. Afterwards, the collected data can be analysed and tested based on defined theories and concepts.

Guba (1990) has discussed different research philosophies. He referred the ontology and epistemology to the theoretical backgrounds of the methodology, whereas the methods are the specific techniques to make the methodology actionable. The research methodology and methods in this chapter will be structured based on the (Saunders et al. 2009a) framework, which is described in **Figure 7** and named as research onion. The framework explains the stages of the research process, i.e. the philosophies, approaches, strategies, choices, methods and techniques that can be followed to achieve the main aims of the research. The underlined elements represent the choices that have been implemented in this research and will be explained in the following sections.

Positivism

Experiment

• Surveys • Deductive Realism

Mono Method

Cross Sectional

Data collection and data analysis

Mixed Methods **Case Study**

Longitudinal Action Research

Multi-Method • **Interpretivism**

•**Ethnography**

• Inductive

Grounded Theory

Legend:
- Philosophies
- Approaches
- Strategies
- Choices
- Time horizons
- Techniques and procedures
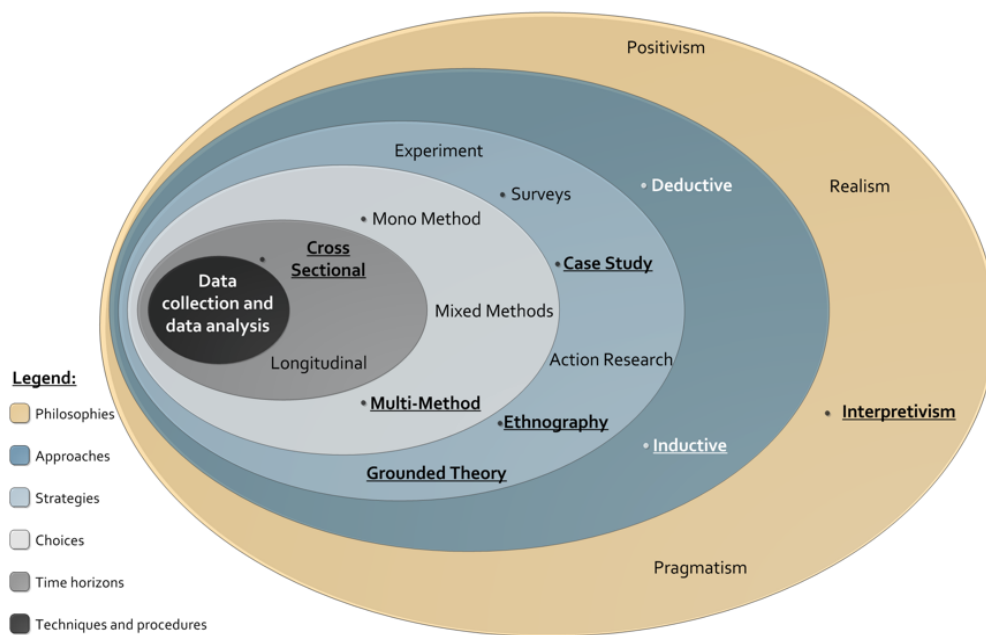
Pragmatism

FIGURE 9: RESEARCH ONION (SAUNDERS ET AL. 2009)

3.1   RESEARCH PHILOSOPHIES

This section will discuss the four main research paradigms: pragmatism, positivism, realism and interpretivism. The research philosophy of a research study can describe its assumptions about the way the researcher views the world. This means a researcher who is concerned about facts can have a different view on the way research could be implemented than a researcher looking at attitudes and feelings (Saunders et al. 2009b). To summarise, the idea is not only to ensure a study has followed a correct and well-informed research philosophy but also how well the adopted specific philosophical choices can be defended in relation to the other choices available (Saunders et al. 2009b, Johanson and Clark 2006). **Table** 2 explains research philosophies and data collection methods.

3.1.1   PRAGMATISM

Pragmatics "recognise that there are many different ways of interpreting the world and undertaking research, that no single point of view can ever give the entire picture and that there may be multiple realities" (Saunders et al. 2009b). The pragmatism research philosophy argues that the research question is the most important factor in the research philosophy. It is concerned with the research problem more than the method of inquiry.

The pragmatism research philosophy can incorporate multiple research approaches and research strategies in the same study. Furthermore, studies following the pragmatism research philosophy can merge several research methods such as qualitative, quantitative and action research methods (Wilson 2014). Moreover, pragmatic researchers can combine positivism and interpretivism viewpoints to reflect the research question (Saunders et al. 2009b).

3.1.2 POSITIVISM

In the positivism research philosophy, only factual knowledge can be collected through what researchers can observe and measure. The researcher's role in such a research philosophy revolves around objective data collection and interpretation. Thus, positivism research depends on quantifiable observation research methods that can be investigated in statistical analyses. It has been mentioned by Collins (2017) that "as a philosophy, positivism is in accordance with the empiricist view that knowledge stems from human experience. It has an atomistic, ontological view of the world as comprising discrete, observable elements and events that interact in an observable, determined and regular manner". In practice, research paradigms should provide researchers with a better understanding of the world they are studying. However, in positivism researchers do not participate in this world (Saunders, Lewis, and Thornhill 2009b).

Researchers warn that "if you assume a positivist approach to your study, then it is your belief that you are independent of your research and your research can be purely objective. Independent means that you maintain minimal interaction with your research participants when carrying out your research." (Wilson 2014).

3.1.3 REALISM

Realism is a research philosophy that relates to scientific enquiry. It is defined as "the view that entities exist independently of being perceived, or independently of our theories about them" (Phillips 1987). The core feature of realism is that objects have an existence independent of the human mind (Saunders et al. 2009b). Two groups branch from the realism philosophy: direct realism and critical realism. Direct realism can be explained as "what you see is what you get"

(Saunders et al. 2009b). Critical realism is about "what we experience are sensations, the images of the things in the real world, not the things directly" (Saunders et al. 2009b). Critical realism can have two different steps to experiencing the world. The first is concerns the thing itself and the feelings it evokes. The second describes the mental process that follows the experiencing of the sensation. Direct realism only explains the first step (Saunders et al. 2009b).

3.1.4 INTERPRETIVISM (INTERPRETIVIST)

Interpretivism, also called interpretivist, concerns integrating people's interest in a study. It also considers participants' views, interests and ideas to investigate the situation under research (Creswell 2014). Accordingly, "interpretive researchers assume that access to reality (given or socially constructed) is only through social constructions such as language, consciousness, shared meanings, and instruments" (Myers 2009). The interpretivism philosophy highlights qualitative analysis over qualitative. Moreover, interpretivism research concerns meanings and may apply a variety of methods in order to examine the different aspects of an issue. In this philosophy, different qualitative research methods such as observations and interviews with open-ended questions can be used to maximise participants' opportunities to express their ideas or experiences. Furthermore, secondary data research is also one of the popular methods in this philosophy.

TABLE 4: RESEARCH PHILOSOPHIES AND DATA COLLECTION METHODS (SAUNDERS ET AL. 2009B)

	Pragmatism	**Positivism**	**Realism**	**Interpretivism**
Data Collection Methods	Mixed or multiple method designs, quantitative and qualitative	Large samples Highly structured Quantitative but also might use qualitative	The methods should suit the study's main topic or concern Quantitative or qualitative	Small samples, in-depth To investigate Different qualitative methods

This thesis has adopted interpretivism as its research philosophy for many reasons. Firstly, this philosophy tends to help in the understanding of "the world of human experience" (Cohen et al. 2013) and this thesis focuses on understanding the strengths and weaknesses of gamification by investigating the human experiences with such a system. Secondly, this

philosophy allows for the use of multiple qualitative methods in order to maximise the opportunities to investigate human views and so this thesis has implemented multiple qualitative methods, including observation, open-ended interviews and focus groups. Finally, this thesis has adopted secondary data in **Chapter 4** in order to define a set of gamification risks from existing related studies in order to start the investigation process.

3.2   RESEARCH APPROACHES

The research approach is the general concept that describes the whole research activity, including the data itself and its collection, analysis and interpretation. Two main research approaches are used: deductive and inductive.
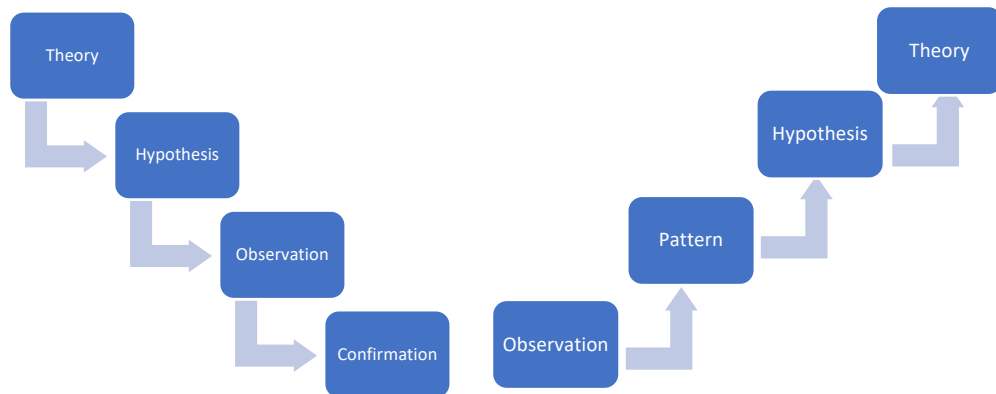
FIGURE 10: DEDUCTIVE VS. INDUCTIVE RESEARCH APPROACHES

The deductive approach aims to test theories using empirical observations of the available facts, while the inductive approach concerns developing new theories from the data analysis. In the deductive approach, the research requires a sufficient sample size in order to produce the findings (Saunders et al. 2009b). In the inductive approach, the research is meant to discover a phenomenon without a framework or theory. In fact, the researcher might discover new facts within existing theories and frameworks. In general, the deductive approach is usually explained as moving away from the general towards the specific and is typically associated with scientific investigation. However, the inductive approach is described as starting from the specific and ending up with the general. Moreover, for complex social and behavioural problems where researchers need to explore the issue from practical examples, researchers should consider inductive reasoning (Thomas et al. 2015). This would help researchers to detect cause-effect relationships without looking for interpretations of their social world (Thomas et al. 2015). In

Deduction emphasises	**Induction emphasises**
• scientific principles • moving from general to specific from theory to data • the need to explain causal relationships between variables • uses quantitative data • highly structured • a researcher is independent of what is being researched • the necessity to select samples of sufficient size in order to generalise conclusions	• gaining an understanding of the meanings humans attach to events • a close understanding of the research context • the collection of qualitative data • a more flexible structure • a realisation that the researcher is part of the research process • less concern with the need to generalise

The inductive approach is the main choice of this thesis. It intends to benefit from the structural flexibility supported by this approach. In addition, this thesis looks to investigate the gamification risks and mitigation strategies from real practice, e.g. call centres in telecommunication companies, which could adopt the inductive approach.

3.3   RESEARCH STRATEGY

The research strategy is the general methodology that directs the research to achieve its purpose and fulfil its objectives. Different purposes can be used with each research strategy, such as exploratory, descriptive and explanatory (Yin 2009). Some of the research strategies belong to the deductive approach, while others are aligned with the inductive. In fact, deciding which particular research strategy is applicable is not about the characteristic of the strategy but whether it helps to answer the research questions and meet the research objectives (Saunders et al. 2009b). Moreover, the strategies can be mutually inclusive where one can be embedded within another. For example, the survey strategy can be used as part of a case study. According to (Saunders et al. 2009b), the research strategies include experiments, surveys, case studies,

grounded theory, ethnography and action research.

3.3.1   ETHNOGRAPHY

The ethnography research strategy is related to the inductive research approach. The main purpose of ethnography is to discover and inspect the social world (Saunders et al. 2009b). It is a time-consuming strategy in which researchers need to spend a long period of time immersing themselves into the environment in order to explore people's behaviours (Saunders et al. 2009b). In such a strategy, the research process should be flexible and accept immediate changes because the researcher might constantly develop new patterns based on new findings in the observed field (Saunders et al. 2009b).

When implementing an ethnography strategy, the researcher might face certain challenges. Researchers need to find a setting or group that is able to fulfil the main focus of the research. In addition, the researcher needs to find a suitable way to negotiate full access into such groups in their environment. Accordingly, this also requires the researcher to build a high level of trust with the people involved in the research field. This requires having a full-time staff member embedded in the environment. Another challenge is related to the validity of the data resulting from this research strategy. It may not be easy to find a suitable way of validating the qualitative data collected. However, implementing a follow-up qualitative research study such as interviews or focus groups either with participants from the same context or with other participants with the same expertise can be a valuable way to confirm the collected results.

3.3.2   EXPERIMENTS

The experiment research strategy is connected more to the natural sciences, especially to social science, e.g. psychology (Saunders et al. 2009b). The main purpose of conducting such a strategy is when the research requires the study of the cause-effect relationships between variables (Saunders et al. 2009b). This is from the simplest example of studying one variable to studying two or more independent variables. Furthermore, the experiment strategy is normally useful to explore and clarify specific research fields in order to answer 'how' and 'why' research questions (Saunders et al. 2009b).

Experiments research is an effective approach for the solution of education-related research, whether it is practical or theoretical (Gay et al. 2009). Often, experiments research is implemented in laboratories instead of in the field, particularly with business and management research (Saunders et al. 2009b).

3.3.3   SURVEYS

The survey strategy is a deductive-based research approach (Saunders et al. 2009b). It is one of the most frequently used strategies in research, especially in business and management research. In this strategy, the focus is usually to answer who, where, what, how much and how many research questions.

The survey strategy can be conducted with a large amount of data from a significant population in a highly economic way. It allows researchers to gather quantitative data and quantitatively analyse this by applying descriptive and inferential statistics. In addition, the researcher should ensure that their sample of participants is large enough and is representative of the whole population (Saunders et al. 2009b).

In the survey strategy, the data collected is limited compared to the data collected through other research strategies. One reason lies with the limitation in the questions any questionnaires might have. Questionnaires are a commonly used data collection method in survey strategies. However, structured interviews and observation methods can also fit the survey strategy as a data collection method (Saunders et al. 2009b).

3.3.4   CASE STUDY

Case studies are defined as "a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real-life context using multiple sources of evidence" (Robson 2002). The case study strategy is a rich way of gaining a clear understanding of a research context (Morris and Wood 2016).

In the case study strategy, the research can be used for explanatory and exploratory research (Saunders et al. 2009b). In this strategy, the researcher can benefit from applying a wide range of data collection methods such as interviews, documentary analysis, observation

and questionnaires (Saunders et al. 2009b). Moreover, a well-designed case study can be used to experiment with theory, as well as explore new research questions.

Case studies are a well-known choice for research evaluations in real-world settings. It might not be seen as a strategy which helps to address all of the evaluation research questions, however, a complete case study usually fulfils the evaluation process and helps to generate new and important findings (Yin 2009).

3.3.5 GROUNDED THEORY

Grounded theory is a useful strategy in building and developing a theory that is grounded in data collection and analysis (Strauss and Corbin 1997). It is a useful strategy to explain and explore behaviours. Moreover, this strategy is qualitatively based and guided by the research question(s).

In grounded theory strategy, various qualitative methods can be used for the data collection process, including interviews, observations, document analysis, diaries and focus groups (Strauss and Corbin 1997). Data collection can be started without an initial theoretical framework foundation (Saunders et al. 2009b). Charmaz et al. (2006) explained that grounded theory is suitable for "studying individual processes, interpersonal relations and the reciprocal effects between individuals and larger social processes"; they exemplified that this strategy can help "[study] typical social psychological topics such as motivation, personal experience, emotions, identity, attraction, prejudice and interpersonal co-operation and conflict".

Grounded theory is the main research strategy that has been followed for this thesis. This strategy emphasises inductive reasoning, which is the research approach of this thesis. Moreover, as discussed earlier grounded theory can help to study social psychological topics like motivation, interpersonal co-operation and conflict. Thus, this thesis is concerned with studying these topics as core aspects of gamification and teamwork. Research following this strategy is flexible and driven by research questions, as with this thesis. However, this thesis does not claim a "full-fat grounded theory" (Braun and Clarke 2006a), which requires deeper questions and theoretical commitments.

3.3.6 ACTION RESEARCH

Action research concerns the researching of an issue and also the simultaneous implications of the resolution actions (Coghlan 2019). In action research, practitioners are democratically and collaboratively involved with the researchers to explore the research issue (Saunders et al. 2009b). Accordingly, action research differs from other research strategies because it focuses more on actions in their particular context, e.g. organisations (Saunders et al. 2009b). Thus, such a strategy is more suited to answering 'how' research questions.

Sandures et al. (2009b) emphasised that the main strengths of an action research strategy are "a focus on change, the recognition that time needs to be devoted to diagnosing, planning, taking action and evaluating, and the involvement of employees (practitioners) throughout the process" (Saunders et al. 2009b). This means that action research merges data gathering and facilitates changes.

3.4 RESEARCH CHOICES

Research choices mainly refer to qualitative and quantitative data (Saunders et al. 2009b). These two terms are widely used techniques for both the data collection and data analysis. As Saunders et al. (2009b) differentiate between the two, quantitative data is numerically based and qualitative is non-numeric or data based. The data choice might include single data collection and corresponding data analysis, or it might involve more than one data collection and analysis technique to comprehensively answer the research questions. Saunders et al. (2009b) classified the research choices under the following two categories.

- **Mono methods,** refers to the combination of one data collection method, either quantitative (questionnaires) with quantitative data analysis, or qualitative data collection (interviews) with qualitative data analysis.

- **Multiple methods,** refers to the combination of multiple data collection techniques in the same research study. This category can be divided into three main subcategories.

  - **Multi-methods quantitative studies,** use more than one quantitative research method, e.g. questionnaires and structured observations and analyse the results using statistical procedures (quantitative).

- **Multi-methods qualitative studies,** apply different qualitative methods such as interviews and diary accounts in the same research study and analyse the collected data using qualitative procedures.

- **Mixed methods approaches,** mix between qualitative and quantitative research methods and data analysis procedures for the same research design. This can be done either in parallel or sequentially. The qualitative collected data can be analysed qualitatively, while the quantitative data is analysed quantitatively.

This thesis adopted the multi-method qualitative method as a research choice. This is due to the need to apply multiple methods in the same research study, as seen in Chapters **4**, **5** and **6**, in order to answer the main research questions and allow for more trusted and concrete findings.

3.5 TIME HORIZONS

Time horizons, as explained via (Saunders et al. 2009b), is related to the particular time the research should be conducted. Two main types of time horizons were identified by (Saunders et al. 2009b): cross-sectional studies and longitudinal studies. The selection of one of these types is connected to the type of research strategy the research is following and also the research study's choice of methods.

- **Cross-selection studies** refer to the study of particular cases at a specific time. This survey strategy is an example of a cross-selection study. For example, when a researcher conducts a study to explore the effect of a phenomenon or to explain the relationship among different factors in a specific situation. However, a cross-selection study might also use qualitative methods such as interviews conducted over a short period of time. This was the choice for this research. The researcher aim to explore the direct effect of a gamification element in staff during their daily work and the side-effects might introduce the teamwork environment as a result.

- **Longitudinal studies** refer to research studies that require time series to explore the change or development of a particular phenomenon. For example, observing people or events over a long period of time to examine the changes in specific variables.

3.6   DATA COLLECTION AND DATA ANALYSIS METHODS

This section is the central slice in (Saunders et al. 2009b) research onion framework. In this part of the framework, the focus is on the techniques and procedures which can be used to obtain and analyse the research data. This includes questionnaires, observations, interviews and statistical and non-statistical data analysis techniques. The following sections will explain the adopted research methods for both the data collection and data analysis techniques. Moreover, a summary of the reviewed research methods and the adapted ones is explain in Table .

TABLE 6: RESEARCH METHODS SUMMARY

Reviewed Data Collection Methods	Characteristic	Used data collection Methods
Observation	Qualitative, to discover people actions in their natural setting	Observation used in **chapter 4**
Interviews	Qualitative, suitable for initial exploration	Interviews method used in **chapter 4, 5, 6, 7**
Survey	Quantitative, large sample, more control over the research process	Not used
Document Analysis	Qualitative, reviewing and evaluating documents	Not used
Focus groups	Qualitative, interactive discussion, require moderator	Focus groups method used in **chapter 5, 6, 7**
Diary Study	Regular recoding of events at the time they occur	Not used

3.6.1   ADOPTED DATA COLLECTION METHODS

This thesis follows a bottom-up research approach in order to progress from data collection and analysis to the theoretical level. The following section will explain the adopted data collection method through the research in order to fulfil the research study's main objectives. The discussion here will be about the general description of the method, while the details of how the method was implemented will be discussed in the chapter in which the method was used to achieve the study results.

3.6.1.1   OBSERVATION

The observation method is a way of collecting data through observations. Observations involve: "the systematic observation, recording, description, analysis and interpretation of people's behaviour" (Saunders et al. 2009b). Two main types of observations are involved:

- **Participant observation** is a qualitative approach which concerns discovering people's actions. During this process, the researcher participates heavily in the action and actively becomes a member of the group, organisation or community. This allows the researcher to become closer to the subject and have the opportunity to feel it rather than observing it. The aim of this method is to "discover those delicate nuances of meaning" (Saunders et al. 2009b). Gill and Johnson (1997) identified four main roles that can be adopted within participant observations;

    - **Complete participant**: the researcher participate as a member of the group and the group has no idea about the purpose of their participation.

    - **Complete observer**: the researchers do not reveal the purpose of their involvement in the group. Unlike complete participant, however, in this role the researchers do not participate in the group's activities.

    - **Observer as a participant**: the researchers are known as researchers in the group and are not involved in group activities. In this role, the researcher gains the benefit of focusing only on their research activities. However, the researcher would be able to discuss the research with the group members.

- **Participant as an observer**: the researchers reveal the purpose of the research to the group members, helping to increase trust with them. The researcher might be involved in the group's activities. This would help them to ask questions when they need to enhance their understanding.

In **Chapter 4**, the researcher conducted an observational study in two companies in order to achieve the objective. Both companies allowed the researcher to observe the actual work environment, have discussions with staff and take notes. This helped the researcher to identify the immediate effect of the gamification system and to gain trust by building a good relationship with the staff. The role played by the researcher was the **participant as an observer** method to observe the actual work environment, collect data and be actively involved with both call agents and supervisors during the observation period.

3.6.1.2   INTERVIEWS

Interviews are a powerful qualitative research technique which helps to gather valid and reliable data in order to fulfil the research questions and objectives (Saunders et al. 2009b). Interview questions can be shaped and designed based on their main purpose. This means the nature of the interviews should be consistent with the interview's main purpose. For example, initial exploration interviews when the researcher has not yet formulated the research study's needs and challenges. One main typology of interviews has categorised them into three main formats (Saunders et al. 2009b):

- **Structured interviews** involve a series of pre-defined and standardised questions. The researcher starts the interview and refers to the written questions one-by-one. This helps the researcher to have clear answers for comparison purposes.
- **Semi-structured interviews** consist of both structured and unstructured questions. In semi-structured interviews, the researcher will need to prepare a list of themes and questions to be covered. Moreover, additional questions might be asked for clarification or further exploration of certain issues. The order of the questions might also differ between different interviews when needed.

- **Unstructured interviews** have no pre-prepared questions. However, researchers need to have a clear background of the aspect they want to explore. In this format, the researcher can talk freely with the participants without any limitation of questions or topics.

In this thesis, all of the interviews that have been conducted in Chapters **4, 5** and **6** were semi-structured interviews. This gave the researcher the opportunity to refine the results and the gathered data and investigate further related aspects. All the main purposes of interviews, as mentioned by (Lazar et al. 2017), have been applied. In **Chapter 4**, the interviews were used to evaluate the results gathered through the observation study. In **Chapter 5**, interviews with experts, managers and practitioners were used for two reasons: to perform an initial exploration of gamification management strategies and to gather more management strategies from both the scientific and practical perspectives. In **Chapter 6**, the interviews were conducted in order to evaluate the modalities of the applications of the management strategies.

3.6.1.3   FOCUS GROUPS

Focus groups are a group discussion involving participants from the same or a variety of backgrounds to capture their experiences and ideas regarding specific topics (Saunders et al. 2009b). Focus groups are an effective and inexpensive way of collecting a wide range of opinions (Lazar et al. 2017). The researcher's main role in the focus group is to work as a moderator or a facilitator in order to ensure the discussion does not exceed the main boundaries of the topic, as well as to guide the discussion towards useful and interesting opinions without leading the participants (Saunders et al. 2009b). The number of participants in one focus group is mainly related to the topic being investigated. While there is not a specific determination of group size, it is often between four to 12 participants (Saunders et al. 2009b).

Although this method can help to gather a good range of points and ideas to the related topic, it may introduce some challenges. The group's discussion might be influenced by individuals. Furthermore, some participants might be discouraged from participating due to a lack of confidence.

In this thesis, the focus group method was utilised in **Chapters 5** and **6**. The focus group conducted in **Chapter 5** was focused on mapping a set of gamification management strategies, alongside a set of gamification risks. Techniques like card sorting were used for mapping management strategies with different categorisations. In **Chapter 6**, two focus groups were conducted to identify a set of modalities of the application of the management strategies to manage gamification risks. Additionally, a checklist tool to facilitate the risk identification process was proposed and examined through these focus groups.

3.6.2 ADOPTED DATA ANALYSIS METHODS

This section refers to the techniques used to analyse and evaluate the collected data through the methods described in the previous section. Since the data collected in this thesis was mainly non-numeric data, e.g. interviews transcript, notes and text documents using qualitative methods, this thesis has utilised qualitative data analysis using content analysis and thematic analysis techniques. Content analysis and thematic analysis are both commonly used approaches in qualitative data analysis.

According to (Strauss and Corbin 1990, 1997) qualitative data analysis generally consists of three main stages. The first stage starts with information about a topic such as interaction behaviour in a specific context. Second is the deep focus on the components and their prosperities and dimensions. In the final stage, knowledge is gained by studying these components and can be utilised to understand the original behaviour and make inferences about it.

Content analysis is a widely used technique in various domains (Lazar et al. 2017). Stemler (2001) defined content analysis as "a systematic, replicable technique for compressing many words of text into fewer content categories based on explicit rules of coding". The purpose of content analysis is to explain the characteristics of the contents by defining who has said what, to whom and its effects (Bloor and Wood 2019). In content analysis, researchers use coding in order to identify and describe the phenomenon from the contents of the collected data.

Thematic analysis is a qualitative descriptive approach and is mainly defined as "a method for identifying, analysing and reporting patterns (themes) within data" (Braun and Clarke

2006b). Moreover, they summarised the thematic analysis process into six main steps, as follows:

- Familiarising self with data.

- Generating initial codes.

- Searching for themes.

- Reviewing themes.

- Defining and naming themes.

- Producing the report.

Both content analysis and thematic analysis follow the same aim of analysing the data from a board term into a narrative by breaking the data into smaller units of content. Despite the similarities between them, it has been suggested that content analysis is more suited to the simple reporting of the common issues mentioned in the collected data, while thematic analysis provides a rich and detailed account of the data (Vaismoradi et al. 2013).

In this thesis, both approaches have been used in **Chapter 4** to investigate the gamification risk factors and exemplars of risks in order to develop a risk identification and mangement method. In **Chapter 5**, content analysis is adopted to analyse the data gathered through interviews and focus groups in order to propose a set of management strategies for the identified gamification risks. In **Chapter 6**, two focus groups and interviews were audio recorded and transcribed. The data collected were analysed according to the six phases of thematic analysis proposed in (Braun and Clarke 2006c) to map between the management strategies with different categorisations and to propose their modalities of application.

3.7   DESIGN APPROACHES

The section will discuss two well-established design approaches which are the participatory design and the user-centred design approach. Both approaches are referring to the design with different ways of involving users or stakeholders in the design. Understanding the user's interactions or requirements of a gamification system would help more to investigate how this system might have negative effects on the users. To achieve this, users' active involvement in

the investigations processor in the design stage itself would help to increase the acceptance and minimise the side-effects of such a system. The following sub-sections will briefly explain these two approaches. Moreover, in section 3.7.3 a brief introduction about the scenario based approach which is a well-known approach to be used to enhance participants understanding in the design session.

3.7.1 PARTICIPATORY DESIGN APPROACH

Participatory design (PD) has a variation called co-design. In PD, users become part of the design team and have the ability to provide decisions from an early stage of the software process (Sanders 2002). PD and USD both have similar design purposes whereby users are the main element in the system life cycle. However, PD places more emphasis on the engagement of users at the design stage.

Researches emphasised the usefulness of users' involvement in the design process. As discussed in (Kensing and Blomberg 1998) that many designers and managers also show interests on the importance of involving workers in the design and the implementation of a software system in the workplaces which would help to realise their skills and experiences in the design. The authors added that this can assist for better integration between the ways people like to implement their work and technology support. However, involving workers (users) in the design session with the management should be clearly governed as this might silence their voice in the session (Kensing and Blomberg 1998).

Many tools and techniques have been developed in the literature for the implementation of the participatory design approach. Grønbæk et al. (1997) developed an approach called Cooperative Experimental Systems Development (CESD) and commented that "is characterized by its focus on active user involvement throughout the entire development process; prototyping experiments closely coupled to work situations and use scenarios; transforming results from early cooperative analysis/design to targeted object-oriented design, specification, and realization; and design for tailor ability" (Grønbæk et al. 1997). MUST is a participatory design method developed by (Kensing et al. 2009) which explains the cooperation between managers, users, and internal IT developers. The method provides guidelines and principles for governed

different aspects in the design such as the new technology, the organisation settings and the skills users are needed for dealing with the new technology. Spinuzzi (2005) proposed a methodology for participatory design. The authors grouped the process into three main stages;

i. **Initial exploration of work**: this stage is conducted in the real workplace. Researchers immerse themselves with people in their actual work settings. Examples of techniques can help to deliver this stage are ethnographic methods such as observation, interviews, walkthroughs and organisation visit.

ii. **Discovery processes:** this stage focuses more on the cooperative interaction between users and designers or researchers to understand the goals, needs, values and desired outcomes. This stage should focus more on delivering the meaning of the work more than only describe it. Methods can help in this stage like organizational games, role-playing game, organisational toolkits, and future workshops and storyboarding.

iii. **Prototyping:** it is an iterative process in order to formalise the final artefact. In this stage, designing techniques can be utilised in order to shape the final artefact such as, mock-ups, Paper prototyping, cooperative prototyping and PICTIVE. Guida et al. (2013) summarised that this stage should be designed in order to (i) understand users requirements and the operational context (ii) eliciting and validating needs (iii) exploring issues in relation to the design of the system (iv) examining suitability of the design decisions and (v) encouraging communications and progressive learning.

Most gamification techniques are based on group and social activities (e.g. leader-boards, badges etc.) and require social comparisons. Achieving acceptable and effective design requires not only involving the users in a classical way (e.g. requirement elicitation and validation) but also in the design process itself. The evolution of the gamification design can be decided and agreed from an early stage of the software lifecycle which helps the software to adapt and implement any further changes or developments. The Standish Group (2016) reported that users' involvement in information technology projects is the main element in the success or failure of systems.

This research's initial result proposed in **Chapter 5** set of management strategies to minimise the side-effects of gamification on teamwork. Some of these strategies require PD

session to be agreed and facilitated. For example, strategies like commitment, facilitator and voting are mainly proposed to facilitate negotiation sessions at the design stage for the better risks assessment process. Moreover, this thesis utilised PD in order to propose the **GamRisk** method. The investigation process is described in **Chapter 4** where the researcher implemented observation in two large companies for two months followed by interviews with 15 participants in their workplaces. In addition, the validation study discussed in **Chapter 8** has employed PD with mix participation of management, end-users (staff) and system analysts in order to investigate the ability of the proposed method to identify gamification risks in a given case study and help to mitigate them.

3.7.2   USER-CENTRED DESIGN

User-centred design (USD) is defined as "a broad term to describe design processes in which end-users influence how a design takes shape" (Norman and Draper 1986). In USD the focus more on users requirements and preferences and also being tested on actual users to ensure the validity of the system (Abras et al. 2004). USD helps software designers to ensure the productivity and usability of their systems.

Eason (1987) identified three types of users: primary, secondary, and tertiary. Primary users are the essential people those practising the actually use the artefact. Secondary users are those who will use the artefact from time to time or through a medium. Tertiary users are the people affected by the use of the artifact. For the successful implementation of an artifact, the design should conceder a wide range of stakeholder in the design process. However, only users that are affected by the artifact need to be represented on a design team (Sharp et al. 2008).

Abras et al. (2004) described an approach to users' involvement in the design process. The approach involves the following steps or guidelines:

- At the beginning of the design project, interviews and questionnaires can be used to collect data regarding users need and expectations.
- At the early of the design cycle, further interviews and questionnaires to collect data related to work sequence.

- Moreover, at the early of the design cycle, focus groups involving a wide range of stakeholders to discover issues and requirements.

- At the same time of previous, an on-site observation to collect data about the environment.

- In both early and mid-point of the design cycle, a role-playing, walkthroughs and simulations to evaluate the alternative design options and gain closer insights about users' needs and requirement.

3.8   SCENARIO BASED APPROACH

A scenario is a story representing actors or agents who have certain goals and objectives through a sequence of actions and events (Carroll 1995). The Oxford English Dictionary defines a scenario as "the outline or script of a film, with details of scenes or an imagined sequence of future events". Scenarios can be applied in reasoning about design and can also help as part of testing and evaluation methods (Monk 1993). Sutcliffe and Carroll (1998) identified several purposes of scenarios in the design process, including the fact that they offer a useful approach to requirement elicitation. Rolland et al. (1998) describe the main purpose of scenarios as being associated with describing the real situation and the captured requirements.

In this research, scenarios used as an effective technique in the focus groups studies explained in **Chapter 5** and **6** in order to engage participants with the research problem and enhance the chance of comprehending better the underlying concepts, etc. Moreover, scenarios used in **GamRisk** method as a representative tool to specify the different cases or situations that might exist when applying a gamification element in a business work environment. In **Table 7** a quality criteria principles are presented which were compiled from the related literature (Sampaio et al. 2000, Gough et al. 2019, Sutcliffe 2019) to guide the scenario generation process.

TABLE 7: SCENARIO QUALITY CRITERIA

Guidelines and Quality Criteria
1#: Document the requirement specifications. Creation of documents including different requirements existing in the system, for

example, the project's scope, groups, environment, the agents in the groups, the stakeholders' needs and the service needs.

2#: Identify the main actors in the system.

This includes their goals, roles, responsibilities, aims and the tasks in which they are participating.

3#: Describe behaviour-related information.

This includes tasks, events, actions, activities and obstacles. Some user behaviours in the system cannot easily be captured through the models (developed in the first step of the method), and scenarios can therefore be used to support the descriptions of behaviours for both users and the system itself.

4#: Present a comprehensive set of relations.

This includes the relations between actors, roles and tasks. For example, a relation such as a dependency between goals, actors, and tasks should be clearly specified in the generated scenarios.

5#: Explain motives (rewards) and their related information.

The motivational elements used in the model of the organisation should be clearly identified in the scenarios. This includes the nature of the rewards used in the system, and value and reward strategies.

6#: Write scenario sentences as concisely as possible.

This will help to avoid confusing the readers, especially if these are normal users, and will help them to understand the situation and provide their related requirements. It is also preferable to avoid using words like 'may', 'must', 'can', 'should' etc.

7#: Describe the action or activity in the scenario clearly.

This helps to avoid any ambiguity and vagueness in describing the situation. Current actions in the system or predicted future actions should be clearly described, such as whether the goals can be achieved through the tasks or whether the dependencies between actors prevent them from carrying out the task.

8#: More scenarios give better coverage of potential gamification risk situations.

It is often difficult to decide when an adequate set of scenarios has been created. However, the checklist proposed in the next step of the method is a useful tool that can

act as a guide in deciding whether the set of scenarios covers all potential risk situations and is therefore sufficient, or whether more scenarios are required. This checklist consists of a list of elements that the system analysis team, the managers and the end-users should examine to ensure that they cover all possible risk situations. This means that the checklist tool will be used in the next step in parallel with the scenario step for better risk elicitation and a more complete identification process.

3.9   ETHICAL CONSIDERATION OF RESEARCH DESIGN

Ethics is defined as the "norms or standards of behaviour that guide moral choices about our behaviour and our relationships with others" (Bell et al. 2018). Researchers need to think carefully about the way in which they gain access to the research field and about the potential ethical concerns that might arise in relation to the conducting of the research studies (Saunders et al. 2009b). Researchers should first obtain approval from the formal research Ethics Committee of the responsible authority for their proposed research, including their data collection methods.

Researchers should also consider gaining the acceptance of the gatekeeper or broker who controls the research access and is responsible for the final decisions regarding allowing the researcher to conduct the research (Saunders et al. 2009b). Another ethical consideration is focusing on protecting the rights of the research participants. Participation should be voluntary and participants should not be forced to take part in the research. Moreover, consent, anonymity and privacy are all major aspects and require full and careful consideration in the research setting. This means that participants should be clearly notified of the research procedures, risks and issues related to their participation in the research. Accordingly, participants should be clearly informed regarding their data rights and protection settings.

In this thesis, to ensure the research study is conducted with integrity and is ethically correct, all studies were reviewed and approved by the Bournemouth University Research Ethics Committee (BUREC). The research studies involved in this thesis were below the minimal risk outlined, which means the potential risk of participating in these studies is not bigger than what participants encounter in their everyday life. Participants' signed pre-obtained

consent forms which explained their rights. Participants were also fully informed of the research procedures by being given a research information sheet well before taking place in the study. This includes research goals, questions, participants' roles, data protection and the anonymity procedures. All of the collected data were anonymised and stored in a safe place. Similarly, the audio files were transcribed and then destroyed.

3.10   RESEARCH METHODS AND OBJECTIVES

The following diagram provides a map between the followed research method and the thesis objectives.
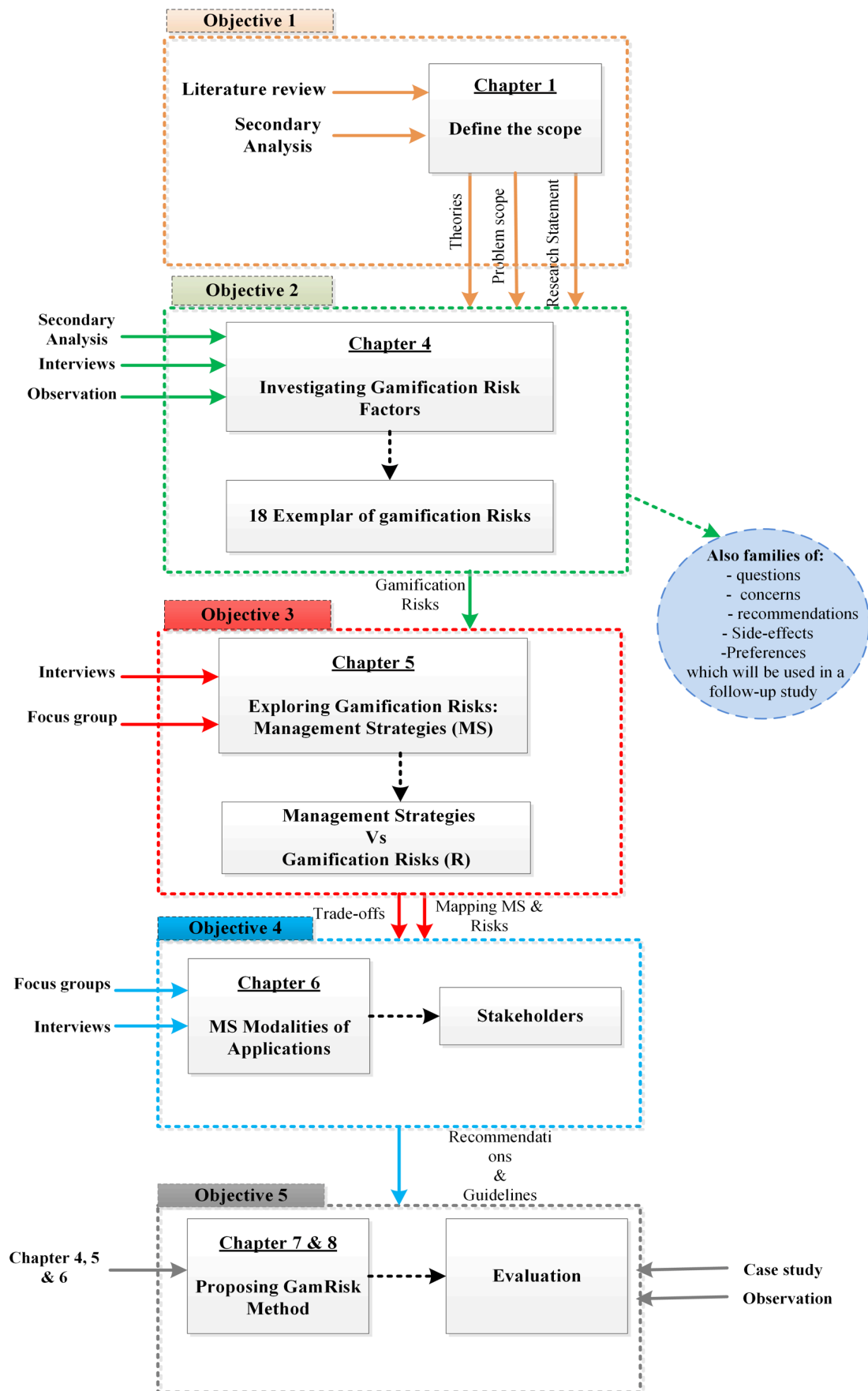
FIGURE 11: RESEARCH METHODS AND OBJECTIVES

4. CHAPTER 4: GAMIFICATION ON TEAMWORK: RISK FACTORS

Despite of the increasing trend of applying gamification techniques in Business Information Systems (BIS), research indicates that it might introduces risks to the business environment, and not only fail to have a positive impact, but also raise concerns in relation to ethics, quality of work, and well-being in the workplace. One of these main risks, is the impact on teamwork and the collective performance environment. According to (Shahri et al. 2014) introducing gamification element in a teamwork setting might trigger negative group reactions such as social loafing, unofficial clustering and freeriding. Moreover, researches have indicated the lack of rigorous research and frameworks toward preventing gamification system from causing ethical and moral risks (Raftopoulos 2014).

Ethical and moral connotations of gamification system are the main focus of various studies in the literature. For instance, Kumar (2013) identified five steps towards the design of such motivation elements and named them as "Player Cantered Design". They emphasize awareness of ethical considerations in the design process. Apter and Kerr (1991) highlighted in their work the unwanted effects - such as stress and anxiety - resulting from pressures for efficiency through the application of gamification elements. Finally, Thiebes et al. (2014a) conducted a systematic literature review on design for motivation through gamification, and found that research on the risks of these elements is still in its infancy and opens the way for more research in the area.

Gamification risks can relate to intra-group and inter-group factors. It can use team competition and comparisons to motivate individuals through group membership and group identity. For example, to encourage the learning of a specific subject, students can be divided into groups before they are given a set of tasks to complete, using a leaderboard and a progress bar to visualize the success rate, and also the speed of each team. These gamification elements are usually meant to encourage team members to collaborate and take collective responsibility. However, counter-productive behaviours, such as social loafing and free-riding, can also occur as a result of omitting the measurement of individual performance.

4.1   RESEARCH GOAL

Despite the recognition of potential side-effects of gamification, factors that contribute to these risks still need to be identified and conceptualised in a comprehensive way. As a result, this chapter is dedicated to conceptualise the main risk factors of gamification system when being applied to a teamwork environment. Also, it investigates potential risks these factors might introduce to the work environment. This is a preliminary step prior to studying the approach which could help to elicit risks in gamificaiton when applied in a teamwork environment. As a research method, a multi-method qualitative approach was adopted (Saunders et al. 2009b). consisting of three main phases: exploratory, confirmatory and clarification. Data were mainly collected through observing and interviewing key informants in two large-scale businesses which use gamification in their workspace. The data analysis is based on key theories in the domains of motivation, persuasion and their digital incarnations, group dynamics, and social and cyberpsychology.

4.2   RESEARCH METHOD

This chapter adopted an empirical investigation, including a variety of research methods. The aim is to explore the main factors in gamification system, including the motivation elements, tasks, goals and stakeholders which might pose risks to the teamwork environment, and affect the validity of the system. The research method a three-stage study, summarised in **Table 4**, employing multiple data collection methods from different sources aiming to increase the diversity and the credibility of the results. The materials used in these studies are present in **Appendix 1**.

4.2.1   FIRST STAGE: EXPLORATION

In the exploration stage, a preliminary set of risks of gamification system in its different version were identified, including gamification (Deterding et al. 2011), game with purpose (Ahn 2006) and persuasive technology (Fogg 2009). This was mainly informed by the literature in risk assessment and management (Boehm 1991), value sensitive design (Friedman et al. 2013), and group dynamics (Dion 2000) The identified risks were used as a template to guide a secondary

analysis of the data collected through interviews with experts, managers and end users taking part in gamification. The primary analysis results were published in (Shahri et al. 2014, Shahri et al. 2016, Algashami et al. 2017) showcasing good an engineering practice towards accountable design, ethics of gamification, and gamification system in general. Taxonomy of risks in relation to gamificaiotn elements was created and used as a basis for ten further interviews with specialists in computing, social informatics, and psychology, as well as practitioners and managers from the selected business. From these interviews, a more refined set of risk factors and mitigation strategies were developed in order to be explored further in the second stage of the adopted research methodology.

4.2.2   SECOND STAGE: CONFIRMATION AND ENHANCEMENT

The second stage aimed to refine the results of the first stage and to identify further gamification risk elements, as well as factors and situations which contribute to their emergence. To achieve that, an observational study was conducted in two gamified call centres in two large multinational businesses. The total duration of observations was two months, consisting of a month in each company. By observing two companies, this can increase the chance of identifying different practices of gamification in different populations. Each of the call centres included over 50 staff. The first belonged to a tourism company, while the second to a telecommunications company. The observation study was combined with 15 interviews with staff working in the same workplace as the gamification system is being used to motivate them, the details of which are discussed in depth in the next stage. The interviews followed a semi-structured style in order to elaborate on notes taken during the observation study and clarify the results of the first phase of the study where relevant. The analysis of the data collected in this stage resulted in several categories of risk. In addition, the analysis also revealed sources and variables which contribute to the emergence of these risks in the socio-technical system where gamification is applied.

4.2.2.1   *OBSERVATION STUDY*

In the observation session, the researcher performed two months' observation study of two call centres in two of the largest companies which have branches globally. The main criteria to

choose the companies were (i) observing different types of gamification elements, (ii) having staff working individually and also as groups in different tasks, (iii) involving staff from different age group, gender and experiences. The first company is a tourism agency specialising in holiday flight and hotel booking. On the first day of observations, the researcher received an induction from the supervisor who explained the environment and work practices, and the motivational techniques used to motivate agents. Also, real examples of the previous results in the motivation elements explained and viewed. The set up in both call centres featured agents in their private cubicles, answering customer calls using a headphone and a screen. Agents were distributed across teams on a self-determined basis, motivated by their collective performance. In the same workplace, another group of staff were working as technical support to all the other teams in the department. A further group of staff were working individually on answering governmental calls, motivated by peer comparison.

The observer in the tourism company (the supervisor) was situated in a transparent glass office which offers the opportunity to monitor staff while they work. The supervisor's main role is to manage the work environment and to send feedback to staff based on their performance. Gamification mechanics used in this call centre included leaderboards for capturing the teams' collective performance (see **Figure 10**) and badges sent by the supervisors based on individual staff performance. The company allowed the researcher to observe the actual work environment, have discussions with staff and take notes. This helps the researcher to identify the immediate effect of the gamification system and to gain trust by building a good relationship with the staff. The researcher was able to meet with the manager to ask questions and verify the observation notes. Moreover, the supervisor gave access to actual examples of feedback sent to the teams.

Call agents are distributed across teams without following a specific method. Junior staff who are asked to attend an induction week in order to understand their duties are also given documents to help them understand the call centre system and the work environment. Incoming calls are distributed systematically to agents. Agents are able to answer a call, put it on hold, or forward it to someone else. While each team involves around seven agents, there was no hierarchy in the team, with all members having similar responsibilities.

The second observation session also was conducted in the call centre. This call centre supports one of the largest telecommunications companies which has branches in different regions of the world. The research observation was concluded within one month. The reason to conduct another observation study in different field was mainly to refine the notes and the results of the first observation and to identify new issues or factors which might have a negative effect on teamwork within a gamification environment. In addition, to explore the effect of different gamification elements and to ensure the kind of risks related to the gamification element itself. Similar to the previous observation, in this work environment, staff were also part of teams, answering customer calls. Each supervisor was given a desk space where they can easily access and observe their staff. The company uses a point system according to which, each team receives points for collective solving customer issues. The highest scoring team is awarded a 10% salary increase at the end of the month. In addition, the names and photos of staff of the winning team are displayed on an honour board, visible to all. The teams are made up of a mixture of randomly allocated male and female staff of varying age and work experience.
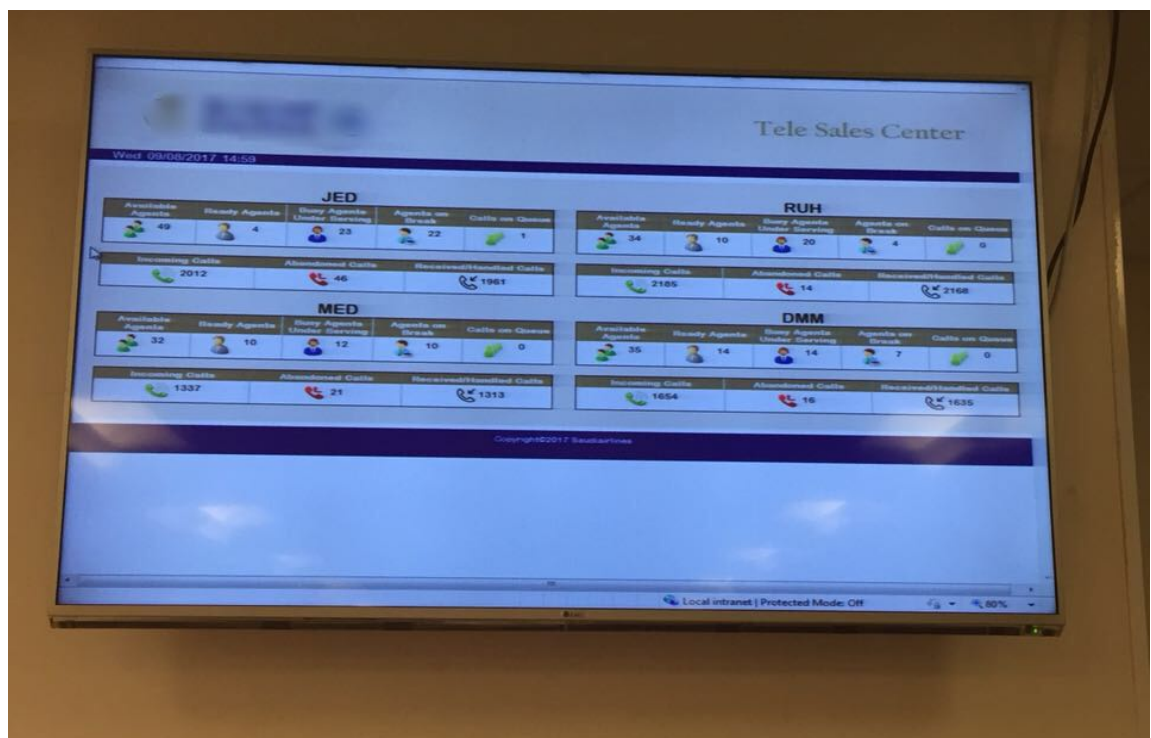
FIGURE 12: A REAL PICTURE OF A LEADERBOARD USED IN THE OBSERVED CALL CENTER

4.2.3 THIRD STAGE: CLARIFICATION

The third stage was designed for further clarification of previous stages and involved interviews with agents, supervisors and managers, to clarify the results of the observation study, which itself was a refinement of the exploratory phase. The interviews followed a semi-structured style. Fifteen interviews were conducted with ten agents, three supervisors and two managers. Summary of the participants' distribution is shown in **Table 4**. Participants involved in the interviews have variable experience in using gamification elements (see **Table 5**). The interviews were scheduled across the period of the observations, allowing the researcher to take notes, amend questions, verify answers and review the outcomes with the participants. The data collected were content analysed according to the six phases of thematic analysis proposed in (Braun and Clarke 2006c).

The participants were informed about the nature of the studies by being given a research information sheet in advance. This includes a description of the aim of the study and all other relevant information. Also, consent was sought for participating in the study, with option to withdraw at any time. All studies were approved by the Bournemouth University Research Ethics Committee (BUREC). In order to achieve comprehensive results, the interviews involved staff with good experience in such system and also staff with less than six months of experience. Moreover, the participants were a mix of males and females as their perceptions in competition and collaboration in such systems might have some differences. In all of the interviews there where induction session before starting the interviews to make sure the participants are familiarised with the topic and will be able to understand and contribute in the interview. Some participants allowed the researcher to record the interviews, while some chose to only take notes.

TABLE 8: CHAPTER 4 RESEARCH METHODS STAGES

1st Stage		2nd Stage	3rd Stage
Exploration		Confirmation	Clarification
Secondary analysis & Literature review	Secondary analysis	Observation	Interviews

-Review of the related literature on: Gamification ethics, Risk assessment in information systems, Game Mechanics and Dynamics, Group Dynamics	- Secondary analysis of data gathered in previous work conducted in (Shahri et al. 2014, Algashami et al. 2017) which involved interviews with experts, managers and end users taking part in gamification.	Two months in two call centres belonging to: - Tourism agency established for 40 years with over 50 call agents. - Telecommunication company has over 19 years of experience and more than 50 call agents.	Fifteen Interviews in two business companies: - 10 call agents - 3 Supervisors - 2 Managers

This study resulted in various factors which contribute to increasing the level of risk in gamification system when applied within a teamwork environment which requires more consideration in the design stage of the system to avoid risks like failures to achieve business goals or causing conflicts among tame members. The result centred on three main aspects, (i) the main factors of risks in the gamification system (ii) main risks associated with these factors written in underline and italic. (iii) their relation to gamification elements and main dynamics.

TABLE 9: PARTICIPANTS DETAILS

Participant Role	Initial	Experience	Gender	Age
Call centre agent	SR	Two years	Male	25
Call centre agent	AM	Two and a half years	Male	25
Call centre agent	FZ	Less than six months	Male	23
Call centre agent	Tl	Less than six months	Female	24
Call centre agent	HZ	Ten years	Female	37
Call centre agent	MA	One year	Female	25
Call centre agent	FM	Six years	Male	30
Call centre agent	KD	Five years	Male	28
Call centre agent	NR	Three years	Female	33
Call centre agent	BB	One year	Female	26
Supervisor	PT	Ten years	Male	39
Supervisor	MD	12 Years	Female	45

Supervisor	YD	Nine Years	Male	42
Manager	AR	15 years	Male	46
Manager	RN	14 Years	Male	48

4.3 GAMIFICATION ON TEAMWORK: FIVE RISK FACTORS

While the gamification system relies intensively on humans with various characteristics and perceptions, it is essential in the design of such system to explore and identify main factors which might increase the chance of risk to occur in teamwork and affecting the coherence and productivity of team members. The consideration of these factors can help to increase the success and effectiveness of the system. After analysing the data in previous studies and performing an observation study alongside with interviews in work environments, this resulted in five main factors which contribute the increasing level of risk in the socio-technical system where gamification element is applied. The taxonomy of these factors is shown in **Figure 11**. Also, an explanation of these factors, their sources and how they have been identified and validated are explain in a table in **Appendix 6.** These classes are related to performance, societal and personal, goals, tasks and gamification elements. The main risks associated with these factors are <u>underlined</u> in the text.

4.3.1 PERFORMANCE RELATED FACTORS

Performance is defined as "scalable actions, behaviours and outcomes that employees engage in or bring about that is linked with and contribute to organisational goals" (Viswesvaran and Ones 2000). Performance monitoring is commonly used in organisations and has become widely pervasive with the aid of digital tools (Ball and Margulis 2011). Performance measurement is challenging and requires well-defined metrics to increase its validity and minimise its side-effects. Researchers identified different main sub-dimensions which can be used to classify user performance. Koopmans et al. (2011) identify the following dimensions to describe individual work such as:

- Productivity: describes the number of requirements stakeholders performed in order to achieve their goals in a given amount of time.

- Quality: the quality in gamification performance is meant to explain the degree to which requirements comply with stakeholders needs.

- Creativity: the innovation of something new or the creation of a good way of implementing an existing thing. "The ability to produce work that is both novel (i.e. original, unexpected) and appropriate (i.e. useful, adaptive concerning task and constraints)" (Sternberg 1999).

A less qualified design of gamification system might affect staff productivity especially when the gamification elements distract users from the main purpose of the task or activity (Blohm and Leimeister 2013). For example, in a leader-board gamification element, workers are ranked based on their productivity such as, the number of customers calls answered in a call centre. Focusing on increasing the number of calls answered could distract from the main purpose of the task i.e. increasing customer satisfaction. While a principal aim of gamification in an enterprise context is to increase staff performance, this research found that the performance can be a source of risks in the system through the following four main risk factors. Summary of the risk factors and the potential risks are shown in **Table 6**.

4.3.1.1 PERFORMANCE COLLECTIVISM

Gamification elements, using rewards and feedback on the collective performance of staff, might have a negative influence on the level and quality of collaboration among them. Risks of free riding occur when some team members tend to perform less well as they receive rewards equal to others, regardless of their individual performance. This has a high probability to occur when staff performance is gathered collectively. This might cause conflict in team and reduce the chance of achieving its business goals. For example, points were given collectively to teams in the call centre, when resolving customer complaints without taking into account the variable individual performance within the team. Moreover, risks can be seen when some team members work only to meet the minimum task requirements without paying enough consideration to the level of quality of their work. Although the collective performance is needed for the sense of teamwork, these situations might affect the work collaboration and create risk in the workplace.

In other words, solving such issue requires mitigation techniques which support a sense of auditing and checking strategies, rather than just avoiding collective performance tasks.

4.3.1.2   PERFORMANCE FEEDBACK

Feedback related to staff performance is a vital element of motivation, but it may also contribute to risks related to the quality of the teamwork environment. An example is a badge or an avatar representing the current status of work quality. The main risk here is the misjudgement of performance. In a teamwork environment, feedback can be based on self-comparison, i.e. comparing performance to one's own performance in the past, peer-comparison feedback, i.e. comparing a person to others in their team, or collective-comparison feedback, i.e. comparing teams' performance to each other. Participants agreed that receiving feedback based on their collective appearance in the leader-board might have an adverse effect and commented *"It's really depends on individual' personality; some colleagues feel frustrated when knowing that others are performing better".*

The results of this research showed different preferences about receiving performance feedback which shall be met to avoid risks. The source of feedback is the primary factor. Feedback can be generated by managers based on human-made judgments or software based on algorithms. Feedback from a human is seen to overcome the limitation of machines of measuring performance only based on the software-monitored performance indicators, e.g. number of calls answered but without looking at the quality and difficulty of the issue. Feedback from machines would suit the performance of tasks which are uniform and quantity based. It can also be preferred when objective measures are provided, e.g. customer feedback and rating. Manager feedbacks can reduce risks when the task is quality oriented and uneasily measured by machines. To reduce this risk, a blended approach can also be needed, e.g. when managers moderate the judgments made by the software. Besides the perceived misjudgement in feedback, clustering groups is another risk which can stem from feedback based on collective performance in teamwork. Top performers members may form their own teams and win. Moreover, feedback can be associated with past performance, e.g. examples of the previous behaviour in a task which might help to ease the future work (Liu et al. 2011). In a teamwork

environment, receiving such type of feedback may have a negative influence on staff that recently joins the team. It may <u>lower self-esteem</u> or make them less motivated to engage with the team.

Moreover, feedback can be associated with users' past actions and performance e.g. reminder of the previous behaviour in a task, which might help to simplify future work (Liu et al. 2011). Similarly, receiving collective feedback regarding past behaviours may have negative influence on staff especially when new staff are involved. This means, new staff may use such feedback to regulate their effort based on previous results rather than based on the required criteria of the task.

4.3.1.3 PERFORMANCE TRANSPARENCY

Transparency of a gamification system collected performance data, and judgments derived from processing such data, manifests itself in three ways; transparency to managers, transparency amongst acquaintances involved in or doing the same task and, finally, transparency with staff in the department or the organisation. Although performance transparency can mitigate risks about perceived unfairness and conspiracy, it seems that several ethical and moral concerns arise as a result of it (Raftopoulos 2014). There is a fine line between transparency as an enabler for trust in a gamification system and as a <u>counterproductive comparison</u> and <u>pressure</u> tool. For example, disclosing the number of calls answered and points earned by each agent can increase competition and improve performance but, at the same time, it may convert sales representatives to set their performance goals based on other staff performance rather than the company target. In the observed call centres, performance transparency causing staff to be featured on the leaderboard was not appealing to those who "*did not like to be known as a top performer because others start to come to their desk and keep asking help*". Transparency can increase the chance of <u>anchoring bias</u> among workers since it may spark the idea of seeing other's performance as a benchmark rather than a reference to help to realise personal strengths and skills aiming to employ them in better-suited tasks.

4.3.1.4 PERFORMANCE DEPENDENCY

The likelihood of risks in a teamwork environment increases when gamification techniques monitor and reward staff performing tasks which cannot be fully achieved independently. In the case of the call centre observations, risks of frustration and tension increased when an agent from the customer calls team needed support from a busy IT team to close a customer complaint. This can give rise to bribes, where a person may need to offer something in return to their dependents to get the gamification reward (Shahri et al. 2014). To address this issue, the gamification mechanics should be designed in a way that recognises potential deadlocks with the ultimate goal of not affecting the level of assistance required between staff.

TABLE 10: POTENTIAL RISKS IN RELATION TO PERFORMANCE FACTORS

Risk Factor	Main Risk
Collectivism	Free riding, Act to meet the minimum requirements
Performance Feedback	Misjudgements, Clustering groups, lowering self-esteem
Transparency	Counterproductive comparison, peer pressure, anchoring bias
Dependency	Bribe for exchange
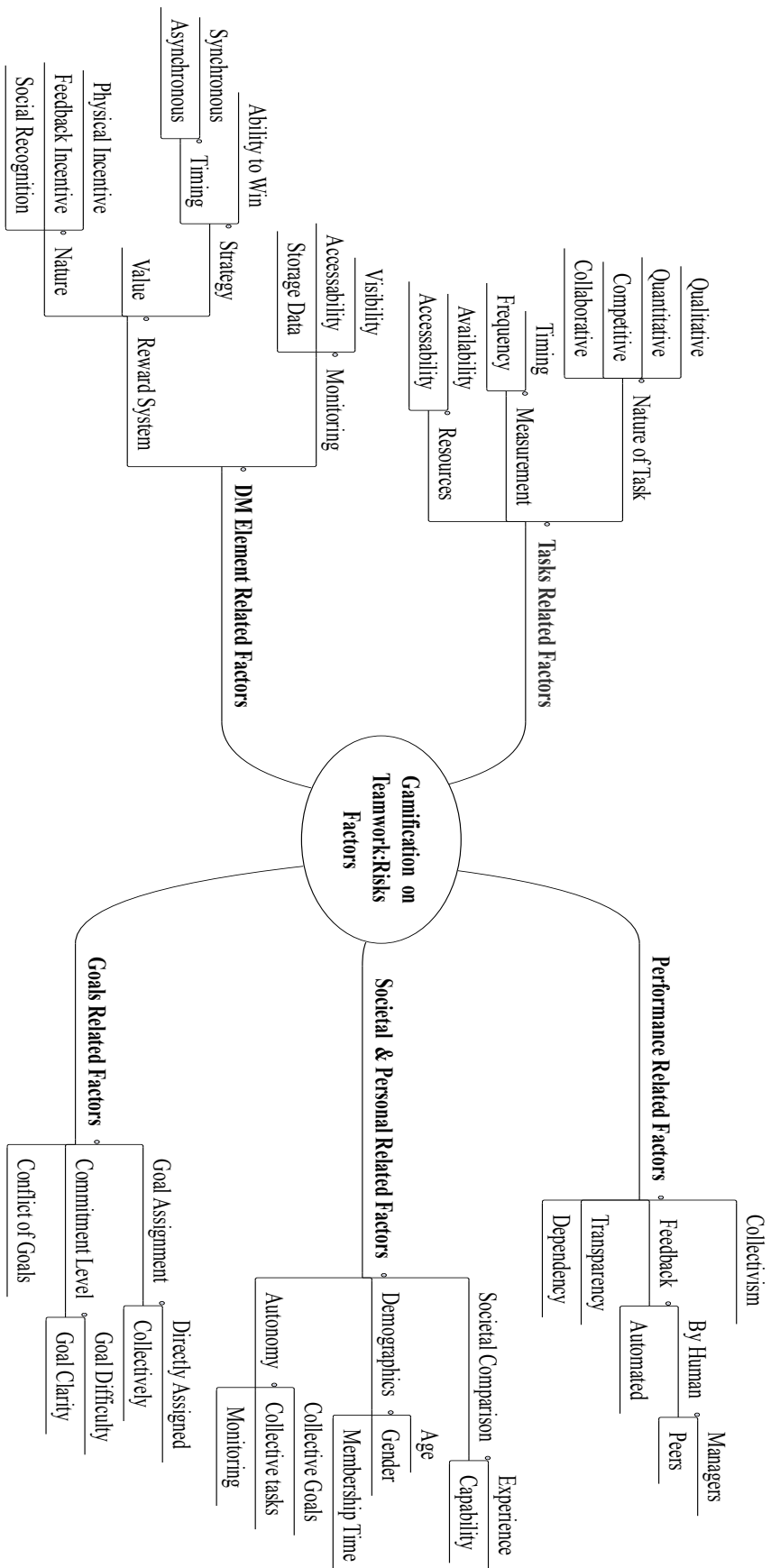
FIGURE 13: GAMIFICATION RISK FACTORS

4.3.2 SOCIETAL & PERSONAL RELATED FACTORS

Societal factors relate to the effects of a behaviour or a perception in relation to other staff, while personal factors relate to traits and inherent characteristics of staff. Understanding and identifying those factors could encourage best practise of the system. Societal factors are occurring when individuals' opinions, actions and behaviours are affected by others. Summary of the risk factors and the potential risks are shown in **Table 7**.

4.3.2.1 SOCIETAL COMPARISON

Comparing staff with different capabilities and experiences, especially on a competitive basis, is a significant risk for a gamification system. Lowering self-esteem and intimidation are examples of such risks. Comparison is an essential game mechanics. Its design should seek to incorporate the differences between subjects, and measure their progress in a relative way. A participant mentioned, "*I feel [stress] as all of my team members have better experiences in the task, so I never appear in the leaderboard*".

While most of the gamification elements adopted some comparison techniques in order to motivate users via peer-comparison or team-comparison, designers of such elements would need to have enough understanding of the targeted users from the design stage of the system and maximise the opportunity to make the system a win-win for everyone involved. Applying strategies which could encourage collaborative work environment, especially with unavoidable inequality comparisons would help to alleviate such risks in teamwork.

4.3.2.2 DEMOGRAPHICS

An important consideration in gamification design is to consider the variation in users demographic and predict the impact it might have on the system. The analysis of the result shows that staff have different views of using such motivational system in order to increase their performance because of certain demographics elements, e.g. gender and age. Research emphasises that both age and gender represent a perspective on such motivational techniques and relevant context such as games and gameplay (Griffiths et al. 2003, Greenberg et al. 2008). Age, gender and membership time in the team appear to be the main factors in demographics which might have a negative effect on gamification application in teamwork environment.

Age, research indicates that age plays an important part in digital gaming (Koivisto and Hamari 2014). Furthermore, older users of technology adaptation affected more by societal influence than young users (Morris and Venkatesh 2000). It can be argued that "*being with younger members in the same teamwork frustrated, as they have better ability in digital techniques and their chance of winning the reward is higher*". This means that risks like <u>unfair comparison</u> could happen as a result of involving staff with various ages in the same competition.

Gender, research shows that motivational aspects are a major part of the differences between genders in gaming (Koivisto and Hamari 2014). Also, the observation study identifies that for women use of motivational elements the societal benefits play an important role. This means rewards based on societal recognition might cause <u>unnecessary peer pressure</u>. Accordingly, Williams et al. (2009) found that in online gaming female tend to be motivated more in societal factors while the male is more competitive and achievement-oriented motivated. In gamification, most of the elements are associated with game dynamics such as, competition and achievement to motivate staff which required careful consideration of gender different preferences in such systems to avoid affecting the teamwork environment.

Membership Time, In additional to age and gender designers should care of the negative effect of the involvement time of new members to a team. The result shows that staff involved in the same teamwork prefer to have a similar length of time in using such a system. A participant mentioned that" *when we have new members involved in the team, we start to feel pressure as they always have a great desire to win the reward*". Moreover, (Farzan et al. 2008) mentioned that the effects of motivational elements on users might diminish with time. The <u>novelty effect</u> of gamification technology means it can be initially exciting for new members, but become less effective for those with longer experience (Koivisto and Hamari 2014). Thus, involving new members to a team might affect the competition and result in such risk to the work environment.

As a result, with such variation in staff preferences of being within gamified tasks in teamwork places, applying strategies in the design stage of the system which could assist to reach collective agreement amongst staff involved in the system are essential to avoid the harmful of demographic factors to the gamification workplace.

4.3.2.3   AUTONOMY

Being obliged or pressured to be part of a gamification system in a perspective way can be detrimental (Raftopoulos 2014). Self-determination theory states that autonomy is one of the human psychological needs and any thwarted it may have in social context would have a robust effect in the environment (Ryan and Deci 2000b). Flexibility and freedom of choice in tasks and goal allocation, primarily when performed collectively within groups, can encourage better teamwork collaboration, and reduce the likelihood of conflicts. The coercion in gamification teamwork environment can take various forms e.g.

- Coercion in collective goals when a user has personal goals in the gamified task and the team has different collective goals.
- Coercion in collective tasks which might cause conflict, especially when a user has no interest in the task.
- Coercion to increase performance via using a monitoring mechanism which might have a significant influence on users.

Flexibility and freedom of choice in tasks and goal allocation, primarily when performed collectively within groups, can encourage better teamwork collaboration, and reduce the likelihood of conflicts. For example, the result identified that pre-defined steps in a gamification tunnelling based technique, e.g. progress bar with tasks and milestones, might be preferred by staff who prefer serialism. Alternatively, staff who have higher autonomy and prefer holism may experience such monitoring and feedback as negative reinforcement. A participant commented that "*I found the pre-defined steps as a sense of force; staff in my team might use it to truck my progress*". Another participant mentioned that "*I feel more belonging to the team whenever the system allows for flexibility in choosing how to perform a task*".. However, the

flexibility needs to be considered using strategies which support the sense of fairly involving staff in a decision-making process to discuss how the system could be implemented and minimise negative effects on staff autonomy.

TABLE 11: POTENTIAL RISKS IN RELATION TO SOCIAL AND PERSONAL FACTORS

Risk Factor	Main Risk
Comparison	Lowering self-esteem, Counter-productive comparison, Work intimidation
Demographics	Lack of group coherence, negative_ pressure, the Novelty effect
Autonomy	Negative reinforcement

4.3.3 GOAL RELATED RISK FACTORS

The results identified that some risks to the teamwork environment could be related to the goals factors, such as main gamification goals (e.g. increase staff performance) or personal staff goals (e.g. winning rewards). Summary of the risk factors and the potential risks are shown in **Table 8**.

4.3.3.1 GOAL ASSIGNMENT

While goals in teamwork can be assigned directly (by a manager for instance) or collectively (among team members), assigning them and define steps to follow them to achieve them might affect the motivation to perform a task. For instance, *"the directly-assigned goals make staff working like a machine and affect their creativity in a task and the interest to perform it"*. On the other hand, in collective goal assignment, staff with high self-efficacy and confidence in their skills and ability to reach goals have more influence in setting goals for the team (Locke and Latham 2002) and this can result in stress to others afterwards. Staff with high self-efficacy may prefer more challenging goals than staff with lower self-efficacy (Locke and Latham 2002). Hence, managing the participation in goal setting is key to set participatory goals.

4.3.3.2   GOAL COMMITMENT

Goals commitment is a vital element in the success and effectiveness of the gamification system. Staff with higher self-efficacy tend to be more committed to assigned goals than those with low self-efficacy (Locke and Latham 2002). In teamwork lack of commitment to goals is strongly related to the level of performance in a task (Locke et al. 1988). This is affected by two factors; goal difficulty and goal clarity.

Goal difficulty, this indicates "a significant drop-off in performance as goal commitment declined in response to increasingly difficult goals" (Erez and Zidon 1984). Moreover, there is a contradictory relationship between goal commitment and goal difficulty (Locke 1982, Erez and Zidon 1984). The study showed that, in gamification teamwork where goals have been set collectively or via managers, the possibility of staff facing difficulties or discomfort in achieving goals is high. Consequently, such difficulties might affect their engagement with the team and create risks like <u>lowering self-esteem</u> and <u>deviation</u> from the primary goal. This means the level of commitment within the team members would reflect in their engagement and performance in the system.

Goal Clarity, This refers to the metrics and steps required for goal achievement. Lack of clarity is another source of risk in gamification which might have an impact on staff ability, intention or desire to commit to a goal. Lack of clarity can be occurring either in stakeholders' goals or in the goal of the gamification system itself i.e. the reasons behind following specific steps in motivating users. An example of this would be the case of adding a progress bar to motivate a call centre agent to help a client in completing an online registration form, but without clearly explaining why the client is given the help, or what system is used to evaluate the outcome. Moreover, lack of clarity in goals and their requirements might have a negative effect on the measurement of the quality of work and make incorrect judgments based on that. For example, applying a motivation element such as points and sending feedback messages to motivate users regarding their performance. The lack of clarity in goals might cause poor design of such massages which might have negative influence on users' performance and might <u>deviate</u> them from goals.

4.3.3.3   CONFLICT OF GOALS

One of the primary reasons for having ethical and well-being issues in gamification systems is its potential conflict between stakeholders interests (Kim and Werbach 2016). In a teamwork environment, conflict of goals can occur when a goal is collectively assigned. This might affect the gamification system and cause staff to have a lack of engagement or a lack of interest in a task, failing to achieve the system goal. A participant in the study stressed the conflict between being *"on probation and having to perform well to get the job permanently, and being with staff who already passed their probation and have different goals in the system"*. This can have an effect on the performance, such as needing to work extra hours and doing other staff tasks who are not under the same pressure, to appear on the leaderboard and prove efficiency. In such cases, identifying stakeholders' goals from the design stage of the system in a participatory approach would minimise the potential sources of such conflicts.

TABLE 12: POTENTIAL RISKS IN RELATION TO GOALS FACTORS

Risk Factor	Main Risk
Goal Assignment	Unnecessary pressure
Commitment Level	Deviation, Low self-esteem
Conflict of goals	Lack of engagement

4.3.4   TASK RELATED FACTORS

Engaging staff more successfully with a task is a key objective of a gamification system. The results of this study indicated gamification risks on team working stemming mainly from the characteristics of the task being subject to gamification techniques. For example, applying a gamification element such as a leaderboard - which follows a competitive ecology - to a collaborative task could have a negative impact on the intra-group relationships. This might hinder the team to keep the collaboration level as it tends to be in order to successfully implementing a task. The following section explores three task-related risk factors about gamification in teamwork. Summary of the risk factors and the potential risks are shown in **Table 9**.

4.3.4.1   NATURE OF TASK

A quantitative based task might introduce a risk such as <u>reduce the quality</u> of the work. For example, customer satisfaction may suffer if the reward is based on the number -rather than the quality - of customer calls. In quality tasks, the risk can be seen by the lack of clarity in setting task specification and requirements. In other words, one way to judge staff performance in quality based tasks is the systematic performance judgment based on electronic monitoring or feedback; this might increase the chance of unfairly judge staff performance, e.g. using predesigned automated measurements. Some participants argued that: *"it is unfair to be judged only based on monitoring customer calls"*, implying that the work required cannot be accurately reflected solely by the actual effort required. They added: *"the quality might be affected by a variety of elements like the level of difficulty and clarity in customers' requests as some are easier than others"*.

Also, risks might also occur if the task is of a competitive nature. The analysis suggested that adding a gamification element to a competitive task can still affect the required level of collaboration among staff in the work environment. For example, in the call centre, staff may choose not to share a good solution for common customers issue with their colleagues to increase their chance to uniquely and efficiently solve more customers complains and win the reward. Similarly, risks also can occur when adding a gamification element to a collaborative task. The study indicated that a situation like <u>social loafing</u>, where individuals reduce their effort when working with a group and rely on others, has a high chance to appear if a collective task is motivated using inter-group competition.

4.3.4.2   MEASUREMENT

Measuring staff performance is essential to decide on rewards and feedback provided through gamification elements. Failure or limitation in such measurement can lead to side-effect on the teamwork environment. Duration and frequency are two aspects which can be used as metrics to assess and measure staff engagement in a task (Zichermann and Cunningham 2011). Two main factors are timing and frequency.

Timing, The real-time ability in gamification elements to track staff performance and send real-time feedback makes the duration of the measurement a source of risk, e.g. unfair judgement. For instance, if the measurement of staff engagement in answering a call is based on real-time voice analysis, such as the level of comfort of the client and the friendliness of the call agent, this might lead to unfair judgments. The staff could be affected via various elements, e.g. difficult customer or inquiry during the performance measurement duration in such motivational technique which might cause unfair judgment of their engagement in a task. For instance, one of the participants argued that:*" judgment based on real-time observation of our performance might be affected by reasons like difficult customer or issue which could increase the possibility of bias"*.

Frequency, Some staff may be more motivated by a daily performance report, while others would prefer it at the end of the task, as evidenced by one participant who stated: *"I prefer to be measured on a monthly basis to be motivated more as I might feel frustrated if I know the result before, like based on weekly or daily results"*. Hence, having both kinds of staff on the same team might have adverse effects on the team.

4.3.4.3   RESOURCES

The availability and accessibility of resources are essential factors which assist staff in performing tasks more effectively. For example, LiveOps, an application for online call centres, facilitates the real-time recording of customers' personal details. Hence, in competitive teamwork environments, where staff compete to win rewards, access to such resources plays a vital role in both individual and team performances. As a result, careful consideration is needed to avoid introducing unwanted bias which could affect staff motivation. In the call centre observed, it was noticed that some tasks required external resources, i.e., resources from another, potentially competing team. This made the possibility of winning the gamification reward dependent on resources from others, which affected the gamification system and created risks. One participant in the call centre commented that *"some tasks required external resources from others which might affect the competition"*. Similarly, in such situations, where there are

team metrics and team rewards, the likelihood of other negative behaviours such as <u>work intimidation</u> is increased.

TABLE 13: POTENTIAL RISKS IN RELATION TO TASK FACTORS

Risk Factor	Main Risks
Task Nature	Reduce the quality, Social loafing
Measurement	Unfair judgment
Resources	Work intimidation, Bias

4.3.5   GAMIFICATION DESIGN RELATED RISK FACTORS

Gamification elements refer to those motivational techniques which can be added to the environment to engage, motivate, and monitor staff involvement in the workplace, as well as to increase their engagement and achieve business goals. Commonly used examples of such elements are points, leaderboards, badges and missions. The digital nature of the motivational elements adds more effective features such as real-time monitoring and feedback, and tractability and traceability of staff's performance. However, the gamification element also introduces risks, especially around the lack of validation and implementation strategies. For example, in the call centre observed, some staff continued to work without taking breaks, due to their perception that their performance - as shown on the leaderboard - was being scrutinised by other staff in the department. This might have a negative impact on the quality of their work as well as their well-being. Below are the two main risk factors identified in relation to the gamification elements. Summary of the risk factors and the potential risks are shown in **Table 10**.

4.3.5.1   MONITORING

Monitoring is an essential mechanism of most gamification elements which can be added to the environment to engage, motivate and monitor staff involvement in the workplace, as well as to increase their engagement and achieve goals. In gamification the monitoring technique allows to measure staff performance and captured related work information. However, monitoring can also have negative consequences in a teamwork environment, due to the following factors.

Visibility, in the monitoring technique, seems to be a serious factor which might cause risks in the teamwork. It was noticed in the call centre observed that some staff had concerns regarding what would be visible to colleagues, either in the same or within other teams. For example, in the call centre displaying the number of calls each team member has answered could impact <u>the coherence of the group</u>. Some staff preferred their current performance to be visible to their managers or themselves only, with the choice to share it with others.

Accessibility, in the gamification system, decisions are made based on information gathered from the environment. In a teamwork setting, the accessibility of staff information in the monitoring technique might have a negative influence on the teamwork. For example, one agent in the call centre commented "*I prefer to have the ability to decide what the system can access regarding my personal information and also what my team members are able to access*". Risks like <u>infringe staff autonomy</u> can result from monitoring staff as they perform a task. For example, a supervisor in the call centre mentioned that they had the ability to access and monitor staff calls at any time. Some staff in the call centre agreed that they "*prefer to know the accessibility time and the sort of information that has been collected*".

The Storage of the data, can be a factor of risk in the teamwork environment. Staff could have a concern about the type of information stored on the system and the access permissions to such information. In a teamwork environment, risk can be seen when performing competitive tasks, where teams might have access to data stored by other teams which might have a negative effect in the gamification system i.e. <u>ineffective competition</u>. For example, in a fitness application where staff are motivated by comparing their performance with peers, making the stored history available to others might affect the competition and <u>kill the joy</u> of the system.

4.3.5.2 REWARDING SYSTEM

The primary motivator of most gamification elements is the reward mechanism. A reward system is another essential factor of the gamification that needs careful consideration to avoid adversely affecting the teamwork. Within the workplace, the gamification reward takes the form of physical rewards, feedback, or public recognition. According to the incentive theory, reward is a type of extrinsic motivation to help people who have a lack of intrinsic motivation to

perform a task or change behaviour. The reward might be a source of risks in a gamification system due to the following factors.

The Strategy, staff have a variety of preferences regarding how they want to be rewarded, which makes the strategy a potential risk factor in a teamwork environment. The strategy of the reward can be seen as a risk when the strategy introduces a sense of <u>perceived exploitation</u> in the workplace. Exploitation can occur when staff feel that their extra performance and quality of work are not rewarded. For example, this can happen when the reward strategy in place only rewards best performance. It would be preferable, in such circumstances, to have a gamification strategy which recognised everyone's performance, and hence, supported teamwork.

The ability to win the reward, is another factor in the reward system factors which might demotivate staff to engage in a task. Staff with low self-esteem might have difficulty to participate in tasks in teamwork when the ability to win the reward is high, which could have a negative effect on the coherence of the team. In the call centre observed, staff could be classified into two categories; those who preferred to be motivated to win the reward by means of a challenge, and those who found it a source of obstruction. Mixing both types of staff in the same team or same competition might affect the system and create a risk such as, <u>lack of group cohesion</u> in the workplace.

The Timing, a reward in gamification system can either be synchronous and asynchronous. In real time, the system allows managers to provide synchronous rewards such as, real-time feedback. This can happen when the required goal of the task is achieved, even before the end of the task time. One example would be answering the target number of calls before the end of the week or month. In the call centre, some staff stated that they: *"I prefer to be rewarded after finishing the task to not lose my motivation"*. However, a participant mentioned that "*I sometimes need extrinsic motivation while performing a task to increase my intrinsic motivation*". In teamwork, especially in competitive tasks, receiving synchronous feedback might <u>negatively affect the quality</u> of the work especially when staff feel they have little chance of winning the competition.

The Value, of the reward is a sensitive element which might affect staff motivation and causing risk to the work environment. A low-value reward might demotivate staff, limiting their

engagement with a task, and affecting their quality of work. The value of the reward should reflect the actual effort staff contribute to a task. In teamwork, for collaborative tasks, the collaboration might be affected when some staff are less motivated to participate in the task due to their perception of low-value rewards. This might cause risk in teamwork and affect the collaboration environment. The overall finding indicates that the value of the reward is recommended to be heavily connected to the level of performance staff required to win the reward, to avoid the risk of reducing motivation. This means, if the ability to wain the reward is low e.g. answering number of calls which can be easily achieved, the value of the reward can be low and as same as when it is difficult to win a reward the value should be high. Risk like perceived exploitation can be occurring when the value of the reward does not reflect the actual effort.

The Nature of the reward, this can have different forms, e.g. physical reward, feedback or public recognition. In the call centre observed, all of these rewards were used to motivate staff. The impact of the nature of the reward is heavily connected with the personality of individuals. The differences in staff preferences about the nature of reward might cause a risk in teamwork effectiveness, which can, in turn, affect the achievement of business goals. Some agents commented that "*we feel more motivated to participate in a task with physical rewards rather than other types of rewards*". Risks like Lack of engagement might occur in the system applied in teamwork when some members are less motivated as a result of the nature of the reward.

TABLE 14: POTENTIAL RISKS IN RELATION TO GAMIFICATION ELEMENT FACTORS

Risk Factor	Exemplar Risk
Monitoring	lack of group coherence, Infringes of staff autonomy, kill the joy
Reward system	Perceived exploitation, lack of group coherence, Reduce the quality, Lack of engagement

4.3.6   GAMIFICATION DYNAMICS VS. RISK FACTORS

Gamification dynamics refers to staff interactions to the implemented gamification mechanisms, e.g. leader-boards, badges and missions to satisfy fundamental desires and needs (Bunchball Inc

2010, Thiebes et al. 2014a). In this section, the discussion will focus more on the possibility of some risks to occur in the teamwork environment because of the dynamic type of the applied gamification element. Also, the discussion will link between the dynamic of the gamification element with some risks and their main factors discussed in previous sections. The analysis of the data gathered from the studies of this chapter indicates some risks which are linked to the dynamic of the gamification element. As discussed in **Section** 4, applying a gamification element such as a leaderboard - which follows a competitive dynamic in work environment with a collaborative nature, could have a negative impact on the intra-group relationships.

Different gamification dynamics discussed in the literature under different classifications and taxonomies. For the purpose of this research, a set of five dynamics was chosen. The selection of these dynamics was based on (i) their common use in most of the gamification elements,(ii) the popularity these dynamics gain in the related literature (Bunchball Inc 2010, Zichermann and Cunningham 2011, Thiebes et al. 2014a), (iii) their representative nature in relation to the gamificaiton elements used in the observed call centres.

Gamification elements might link to one or more dynamics at the same time. For example, a leader-board motivation element can be a competitive based and also has social influence dynamic at the same time. **Table 11** match the common risks discussed in previous sections when gamification applied within teamwork, with the common gamification dynamics which are, *the competition dynamic, collaboration dynamic, accomplishment dynamic and social influence dynamic*.

Competition dynamic, in gamification competition dynamic staff compete with others to prove themselves and get a higher score in a task. A leader-board is an example of a competitive based gamification element in which staff performance are compared with others. In such gamification dynamic, it seems that the common factors which might cause risks into the system are the factors which have effect on the fairness of the competition e.g. availability and accessibility of resources and dependency on others to perform a task. As a result, it seems from the analysed data that risk like <u>unfair competition</u>, <u>social loafing</u> and <u>bribe for exchange</u> which discussed in previous sections have a high chance to occur when the teamwork environment has a gamification element based on competition dynamic. In general, competition as a motivation

dynamic may positively influence motivation of some users (Thiebes et al. 2014a). While most of the gamification elements tap into this dynamic, it requires more consideration to manage the work environment and minimise the high chance of such risk to appear within teamwork.

Collaboration dynamic, staff work together as a team to accomplish tasks or overcome challenges (Hiltbrand and Burke 2011). For example, in collaborative based gamification elements such as, points, leader-board (i.e. collaboration in the same team to compete other teams) staff tend to work together in order to gain more points or appear in the leader board. After analysing the result, it seems that factors like, nature of tasks and goal assignment, discussed in previous sections, might lead the opportunity of risks to appear in a gamification element based on such dynamic. Risks such as, <u>free-riding</u>, <u>lack of productivity</u> and <u>infringes of staff autonomy</u> might have a high chance to appear in a teamwork environment with gamification element based on collaboration dynamic. Moreover, as mentioned in previous sections, the risk also can be seen when applying a collaborative based gamification element within a competitive environment or task this also might affect the validity of the system and increase the chance of side-effects.

Accomplishment dynamic, is the key to drive staff toward making progress, improving skills and overcoming challenges. The accomplishments dynamic refer to a reward for achieving clear and desirable goal (Liu et al. 2011). In gamification elements based on such dynamic, e.g. badges, missions and points staff get motivated via a cumulative nature which helps staff to remain active in the system (Smith 2011). It is a meaningful way to make staff appreciated of what they have done.

In such gamification dynamic, it seems that the risks are more associated with the measurement, monitoring and reward system related factors in the gamification element. For example, in the call centre department, it seems that with the feedback and points type of motivational technique staff always concerns about the measurement techniques and the decisions criteria. Risks like <u>low self-efficacy</u>, <u>unfair judgments</u> and <u>lack of motivation</u> have a high opportunity to appear within such dynamics. For instant, in the call centre department, it

has been noted that agents feel more excited and appreciated with the first and second reward achieved. However, the excitement might be affected by time.

Progression dynamic*, the progression dynamic of gamification elements helps to map staff progression through the task. In such dynamics, staff motivated via knowing the current stage and the next steps toward achieving a goal. Levels and progress bars are gamification elements which have a progression based dynamic. The progression dynamic has some similarity to the accomplishment dynamic as staff feel motivated after successfully achieving a particular level of a task or a system via performing several actions (Hiltbrand and Burke 2011). Most of gamification elements which were based on such dynamic use feedback mechanisms to motivate users or engage them more in a task.

As a result, the feedback and performance monitoring related factors mentioned in previous sections, e.g. performance feedback, incentive feedback might cause risks in gamification elements based on such dynamic. In teamwork, risks like <u>infringes of staff autonomy</u> and <u>reduce quality</u> has a high chance to occur in teamwork environment with gamification elements based on such dynamic. **Table 11** summarise the most risks discussed in previous sections which might appear with such dynamic.

Social Influences dynamic, the core idea of gamification elements based on social influence dynamic is to motivate staff or teams via social dynamics and influences such as, gaining status and recognition (Thiebes et al. 2014a). Elements like leader-boards are the most used mechanics in such dynamic where it can be used to influence individuals or teams to compete with each other's in order to increase performance and win rewards (Thiebes et al. 2014a). In teamwork, gamification elements are typically expected to motivate staff based on social influence dynamic due to the nature of their cooperative environment. In the call centre observed in this study, it was identified that the point system has a social influence on staff which increase their desire to improve performance and gain more points because of the social influence more than the final reward of the motivational system.

In teamwork, the social and personal related factors of risks (discussed in **Section** 4.3.2) e.g. social comparison, demographics seems to be the main source of risks in gamification elements based on such dynamics. As a result, risks like clustering groups, lack of group

cohesion, work intimidation, counterproductive peer pressure and novelty effect have a high chance to occur in teamwork with such gamification dynamics. In another word, negative group dynamics in phenomenon could emerge due to the intervention gamification elements in their daily activities e.g. downward and upward comparison for staff with low or high self-esteem.

TABLE 15: GAMIFICATION DYNAMIC VS RISK FACTORS & EXAMPLES

gamification Dynamic	Factors and characteristics contribute to Risks	Exemplar of Risks
Competition dynamic	Factors which affected the fairness of the competition: e.g. - availability and accessibility of resources - dependency on others to perform a task	Unfair competition Social loafing Bribe for exchange
Collaborative dynamic	Factors which have collective nature: e.g., - collaborative nature of tasks - Collective performance - Collective goal assignment	Free-riding Lack of productivity Infringes of staff autonomy
Accomplishment dynamic	Factors related to: - measurement - monitoring and reward system	low self-efficacy Unfair judgments lack of motivation
Progression dynamic	Factors related to: - feedback e.g. performance feedback, reward feedback - performance monitoring	Infringes of staff autonomy Reduce quality Kill the joy

	Factors related to:	Clustering groups
Social Influence dynamic	- social and personal related factors e.g. social comparison, demographics	Lack of group cohesion
		Work intimidation
		Counterproductive peer pressure
		Novelty effect

4.4   SUMMARY

This chapter explored main factors in the gamification system which might cause risk to a teamwork environment. The chapter also identified potential risks for each factor. Designers of such system should be able to identify these factors and be aware of such kind of risks from the design stage of their system to increase the validity of the system and minimise side-effects. The part of the result was the link between these risks with the main gamification dynamics. Moreover, the result of the chapter emphasises the need to explore strategies and design principles which could help to identify, manage and alleviate the gamification conflicts and side-effects. This will be the main focus of the next chapter.

5.   CHAPTER 5: GAMIFICATION ON TEAMWORK: RISK MANAGEMENT STRATEGIES

This research advocates that some gamification techniques and methods have potential side effects on teamwork. The Shahri et al. (2014) concludes that gamification solutions can cause social and mental well-being problems in the workplace and that there is a need to consider ethics and values when adopting such solutions. Nicholson (2012b) argues that gamification can be seen as exploitation if implemented in certain ways that drive people to do more than their job description would imply. Timmer et al (2015) focus their study on the importance of user-informed consent prior to the use of persuasion. This human aspect in relation to the potential side-effect suggests that we need to take it as an initial requirement when planning and engineering gamification. However, while the focus of existing literature is on ways to develop successful gamification, there exists little emphasis on how to engineer counter-measures to avoid these side-effects.

Issues that may arise as a result of introducing gamification to the workspace include reduced collegiality, negative group relations and low group cohesion. For example, introducing a leader-board to a collaborative workplace which is based on measuring individual performance could lead to less collaboration and introduce questions about the measurement of individuals' performances. Social recognition elements, e.g. badges and status, given to groups based on their collective performance may introduce a risk of social loafing (Chidambaram and Tung 2005) and create pressure for social compensation (Bajdor and Dragolea 2011b).

In previous work (Shahri et al. 2016), a reference model has been explored and developed, putting together the properties of motives, environment and users which are involved when taking decisions during the development and deployment of gamification solutions. In Shahri et al. (2016), various personas were developed and summarised that individual differences need to be catered for gamification design and customization to maximize its acceptance and efficiency and also avoid the side-effects discussed in Shahri et al. (2014). However, the design principles and tools for preventive and corrective mechanisms to deal with these potential issues of gamification have not yet been explored.

This results of this chapter was built on previous results presented in (Shahri et al. 2014) in which strategies that gamification development and management can adapt to introduce gamification into the workplace with the aim of minimizing the risks it may introduce into teamwork were identified. As a method, further analyse of the results of previous works were implemented and the related literature was reviewed to come up with an initial set of strategies. This set is then discussed and elaborated in interviews with managers, practitioners and users. A focus group to confirm and categorize the results was then conducted. The results of this chapter will be beneficial for gamification developers and also other stakeholders including management and occupational psychologists to avoid conflicts and negative experiences gamification can facilitate if introduced without careful considerations.

5.1   RESEARCH GOAL

The goal of this part of the research is to explore management strategies which could help to manage the identified set of gamification risks in the previous chapter. Moreover, the identified management strategies will be classified based on their purposes in order to map them to the identified gamification risks.

5.2   MOTIVATING SCENARIO

This section will present two cases to illustrate how an ad-hoc introduction of gamification could affect the efficiency of the teamwork environment. The first case will highlight workplace intimidation. In the IT department of a company, the front-end development team is responsible for ensuring that the user experience (UX) is kept at a satisfactory level, and also responsible for updating the user interface (UI) when necessary to address customers' requirements. The collaboration of the team members is crucial to the success of the department's work and failure to maintain appropriate communication and collaboration might affect the quality of the final artefact. The UI has great value for the company as they believe this is the client view of the company. Therefore, the company wishes to decrease the chance of failure in the design of the UI as much as possible. Thus, in order to encourage collaboration, the organisation using status as a gamification technique to motivate the front-end development team based on its overall performance. For communication and tracking purposes, team members have access to

individuals' work performance. This could help them to schedule plans and make changes more easily if needed. However, since team members have access to each other's performance details, there is a risk of negative effect in the group. Team members with better performance may feel closer to each other causing groups to form, and this may pave the way for workplace intimidation, where some high-performance employees bully lower-performance colleagues in the team. This illustrates how using gamification might create tension or conflict amongst workers and the need to have strategies to resolve such negative effect.

The second case involves a situation where sabotage could happen within teamwork in the workplace. Two teams are working in an IT department creating a web application. John, Alice and Bob are team A and are working on the design of the UI while Mary, James and Matt are team B and responsible for the back-end development. The manager asks team A to update the design of the UI in a specific time-frame. Bob calls in sick and does not attend work for two weeks. The manager delegates his work to Alice from team B. The department, which uses a leader-board, as a gamification technique, to encourage both teams to finish their tasks on time, decides to give points to the team who can finish the task on-time. In the end, the team with most points will receive a reward. Since Alice is from team B and individual efforts are not acknowledged in this setting of gamification, there is a risk that she intentionally hinders the job thus causing a delay to enable her team win the reward.

5.3   RESEARCH METHOD

This research builds on previous studies conducted in (Shahri et al. 2014), which include interviews and open-ended surveys with experts, managers, and end-users in the domain of DM. This resulted in the identification of various situations where the ad-hoc implementation of gamification could lead to the creation of negative effect and issues amongst employees. The analysis resulted in six representative scenarios in which an ad-hoc implementation of gamification could create a negative impact and issues amongst team members. In order to discover the resolution strategies that could help to resolve the negative effect in such scenarios, a four-stage study shown in **Table 12** was designed for this purpose. In addition, the study materials used in these methods are present in **Appendix 2.**

TABLE 16: CHAPTER 5 RESEARCH METHOD STAGES

1ˢᵗ Stage		2ʳᵈ Stage	3ⁿᵈ Stage
Previous studies	**Analysis**	**Interviews**	**Focus group**

The work done in:
 	
- Previous chapter where risk factors are identified
 	
- Gamification obstacles and ethical issues identification (Shahri et al. 2014)
 	
- Gamification persona aspect (Shahri et al. 2016)
 	
-Gamification modelling and structuring aspect (Shahri et al. 2016)
	- The authors generated six scenarios based on stage 1.
	
	- The authors defined resolution strategies based on:
	
	  - Group dynamics
	
	  - Group cohesion
	
	  - Social identity
	
	  - Conflict theory
	
	  - Change management
	
	  - Occupational psychology
	
	  - Prosocial behaviour
	
	  - Social norms
		The authors refine the strategies through interviews:
		
		- Two experts in computing and social informatics
		
		- Four experts in psychology and cyber-psychology
		
		- Two practitioners
		
		- Two managers
			The authors refine the results from 1ˢᵗ, 2ⁿᵈ and 3ʳᵈ stage via a focus group with a multi-disciplinary participants (see **Table 13**)

5.3.1   FIRST STAGE: EXPLORATION

In the first stage, further analysis of the results from the previous studies including previous chapter studies was carried out. It was informed by the literature using the main theories in group dynamics (Forsyth 1992), group cohesion and development (Tuckman and Jensen 1977), social identity theory (Ellemers et al. 2004), group conflict theory (Forsyth 2009), change management (Hayes 2014), occupational psychology (Ashforth and Mael 1989) and prosocial behaviour (Denham 1986). Various situations were also investigated where ad-hoc implementations of gamification system could create negative effect amongst the social actors within the workplace which resulted in six scenarios according to the main theories in conflict

resolution. This helped to generate around seventeen strategies which are intended to help to resolve negative effect in teamwork.

5.3.2   SECOND STAGE: REFINEMENT

In the next stage of the study, and in order to refine these strategies, interviews were conducted with ten interviewees, including four experts in the domain of psychology; two in computing and social informatics and four from related workplaces of whom two were practitioners and two were managers where gamification techniques have been implemented. This helped to elaborate on the initial set and devise a final set of negative effect management strategies. All of the interviews were recorded and transcribed. The interviews followed a semi-structured style in order to refine with each participant the most appropriate strategies that could help reduce the likelihood of the negative effect, alleviate the adverse effect or resolve it for each scenario. This resulted in 22 strategies which could help in managing teamwork negative impact in relation to gamification.

5.3.3   THIRD STAGE: MAPPING AND CLARIFICATION

In the final stage, the strategies were classified using a focus group with seven participants with relevant expertise. They were asked to map the strategies with the risks using two sets of cards. The participants were familiar with gamification and came from diverse domains (see **Table 13**). Participants were familiarised with the context by means of presentation before the session, the six scenarios were provided as a hard copy, a facilitator explained the scenarios and answered questions during the session, and separate sheets of paper were provided to write down participants' ideas. The session was held in two parts in order to qualify the final results of these strategies. In the first part, the participants were given the scenarios and asked to brainstorm and suggest ideas, strategies and concepts which could help to manage the negative effect in each one. In the second part, they were given a list of possible resolution strategies and the description for each scenario, and then they were asked to provide their perception on these strategies and how they could help to resolve the negative effect on teamwork in relation to gamification.

TABLE 17. FOURTH STAGE FOCUS GROUP PARTICIPANTS

Participants	Research Background
F	Facilitator (one of the authors)
P1,P2	Requirements Engineering, Computers in Human behaviour and CyberPsychology
P3,P4	Human Factors and User Testing
P5	Usability and Human-Computer Interaction
P6	Machine Intelligence and User Modelling
P7	Business Management

5.4 MANAGEMENT STRATEGIES

This section presents another focus of the research, gamification risks management strategies. The identified risks were used to design interview questions and focus group materials in order to propose strategies which could help to manage these risks. The strategies are grouped in three classifications based on their purpose of use in order to manage gamification risks on teamwork environment. **Table 14** groups these strategies based on their main purposes of use to manage gamification related risks.

TABLE 18: MANAGEMENT STRATEGIES CLASSIFICATIONS

Attribute	Strategies
Setting up Agreements and Informing Participants	Commitment, Common ground rules, Facilitator, Voting, Get everyone involved, Norms, Round robin
Checking and Reporting	Auditing, Member checking, Peer rating, Random monitoring, Self-assessment, Storytelling, External party, Regular meeting, Managerial level monitoring, Transparency, Anonymity
Appreciation and Controlling	Reward for helping others, Acknowledgment of individual efforts, Non-contentious bargaining, Rotation sensitivity

5.4.1   MANAGEMENT STRATEGIES FOR SETTING UP AGREEMENTS

The analysis of the results shows that some strategies could be managed and implemented in order to increase the acceptance of the system and inform staff on the work ethics. This could be achieved by running negotiation sessions to share ideas and ask all stakeholders (e.g. managers, supervisors, project leaders, agents and IT designers) to participate in a decision-making session.

• *Get everyone involved*: this strategy could encourage multi-stakeholders in different roles and responsibilities or their representatives to participate in a discussion session to decide and draw behaviours, rules and penalties for the gamification workplace.

• *Common ground rules*: this strategy is based on deriving and enforcing rules that articulate the set of acceptable behaviours in relation to gamification system, in order to facilitate the development of the use of the system within the organization. Examples of such rules include showing respect for others, appropriate ways in which to express oneself, allowing everyone to 'have a say', openness to different views and confidentiality. This would help to manage and facilitate the work environments and defining the acceptable behaviours.

• *Facilitator*: this strategy could play an important role in facilitating the design sessions of the gamification system, including running negotiation sessions, helping people to understand the objectives, and assisting participants to set the common rules of conduct in an effective work environment supported by gamification elements. Moreover, the facilitator is responsible to manage the voting strategy in order to reach agreements.

• *Voting*: this strategy could help to reach a decision in a facilitated session. When multiple choices are available amongst stakeholders in the design sessions, the facilitator could use a voting technique to try to meet the concerns of team members in a democratic and more acceptable style.

• *Round robin*: this strategy could facilitate the discussion by allowing the discussion to pass between participants and ensure equality and fairness during the session. This would help to maximize the ideas amongst participants involved in the session and thus maximize the acceptance of the gamification system in the workplace.

• *Norms*: this technique is based on having a clear understanding of what the organisational culture is, e.g. normal social behaviours. This could help to reduce the likelihood of negative effects on rewarding system environments. For example, an organisation may have a norm of senior managers publicly acknowledging successes of team members in monthly team meetings. A new gamification based reward system such as a leader board may aim to serve the same basic function of highlighting success within the team, but the departure from the previously established norm of face to face social approval may cause resentment in team members.

5.4.2   MANAGEMENT STRATEGIES FOR AUDITING AND REPORTING

These strategies could help to observe the workplace and prevent or alleviate some risks from occurring. The observation strategies can take a different form, which could help to increase the chance for better management in the gamification workplace.

• *Auditing*: means checking individual performances, e.g. giving a quantifiable task and assuming people will also respect quality. Although the auditing technique can help to resolve negative effect on teamwork, one practitioner said "*it should be used in a very careful style to prevent introducing another conflict or side effects*". Auditing technique is the core or the umbrella technique of the following management strategies.

• *Random monitoring*: the idea of this technique is to keep staff aware that their performances might be monitored at any time. The random monitoring either can be implemented automatically by sending regular performance reports from the gamification system to managers or supervisors or by regular inspection of the results by the responsible stakeholders. Moreover, the customers can be also involved in the random monitoring process by using "*secrete shoppers to evaluate the performance and the provided services*".

 • *Peer-rating*: this technique means that colleagues can rate each other's efforts and might be checked at any time to avoid a biased evaluation.

• *Managerial level monitoring*: in this strategy managers take the responsibility to check workers' performances in gamification workplace. This strategy can be applied separately or after another inspection strategy in order to refine the results and ensure complete and fairness.

• *Self-assessment*: users assess their own performances, and this might be checked by managers at any time. This strategy aims to give individuals the responsibility to assess themselves. This can help them to evaluate their engagement with the team and to remain updated about their performance. This can help them to keep their performance at the acceptable level and to compare it to other team members.

• *Regular meetings*: involving teamwork members in regular meetings, e.g. weekly, monthly or annually would help managers to remain updated with the current use of gamification system. Some participants mentioned that "*we need to keep informing our managers regarding the difficulties and other unexpected issues affecting our performance*". The regular meeting can also benefit from applying another management strategy such as being transparent about the performance level compared with others, asking for self-assessment and starting the discussion of the performance level from that to make the staff more informed and engaged in the meeting.

• *Transparency*: this strategy means allowing everyone to see everyone's performances in the gamification system. Although some participants involved in the study agreed on the importance of this strategy to resolve gamification negative effects, others mentioned that "*it should be designed carefully to avoid clustering high performances workers and those of the lower performances*". This strategy needs to be managed and designed carefully and side effects need to be considered fully before making a final decision.

• *Anonymity*: the core idea of this strategy is to give opinions or ratings of colleagues or managers in an anonymous way. This could help make the work collaboration environment open and coherent. For example, this strategy could help when risks occur in the team because the individuals' contributions are not measured. Anonymity in peer rating would encourage team members to rate each other's and performance related risks will be managed.

• *External party*: this strategy proposes to use an external authority or expert to check workers' performances and to resolve or suggest solutions for negative effects which might arise in the workplace. This can help when managers find it difficult to manage risks internally. A participant mentioned that it would" *help[s] to improve the performance of the group because if the inspection comes from the external authorities then I think everybody would be happy with that*".

• *Storytelling*: the core idea of this strategy is to identify a negative effect by asking people to present a situation in a story. A manager involved in the study noticed that "*when we have a conflict in our company I sometimes go out for walk with some of my staff and ask them to tell the situation in a story, this can help to determine the source of the conflict*". Identifying the source of the risks is the core element in order to manage it.

5.4.3   MANAGEMENT STRATEGIES FOR APPRECIATION AND CONTROLLING

Appreciation and controlling strategies are meant to prevent negative actions by encouraging and rewarding positive behaviours. The controlling strategies are mainly meant to control actions and prevent negativity to occur in the workplace.

• *Reward for helping others*: this strategy is related to prosocial theory (Penner et al. 2005), in which users can be rewarded for supporting others. This could be used to encourage collaborative teamwork such as by rewarding workers at the top a leader-board when they help their lower-performing colleagues. This strategy can help to manage risks in relation to collective performance in a task e.g. social loafing and free riding.

• *Acknowledgement of individual efforts*: in some gamification situations, negative effect on teamwork might arise when individual efforts are not equal. This could arise when some workers rely on others to finish a task and are based on the concept of social loafing, so this strategy could help to inspire individuals to engage in group tasks to completion.

• *Non-contentious bargaining*: to manage the work environment when risks occur, this strategy encourages team members to control their emotions in a professional way, such as by counting to ten before taking an action, or writing down their concerns calmly and carefully in an email (McGillicuddy et al. 1984). This strategy can be used to reduce the negative effects of gamification such as some sort of exploitation in the rewarding systems. For example, a group leader may only acknowledge top performing members of a group, via badges and status, despite the remaining group members performing their roles adequately. By expressing their concerns in a calm and reasoned (i.e. non-contentious) manner the group members may be able to reach an agreement with the group leader on how a gamification system can be changed to the mutual benefit of all involved (Forgas 1998).

• *Rotations sensitivity*: this strategy is based on allocating people randomly within the gamification system so that cliques and rivalries are not created. This could help to eliminate the negative effect caused by workers only supporting their close colleagues to win rewards.

5.5   MANAGEMENT STRATEGIES VS. GAMIFICATION RISKS

In the first focus group, a primary task was to match the families of risks with suitable management strategies. The analysis of the results suggested three main classifications of the Gamification risks discussed in **Section 5.4**; ethics related risks, performance and productivity related risks and well-being related risks. The categorisations of the risks and the management strategies were developed to make the mapping feasible at a relatively higher level of abstraction given the fact that a more accurate mapping would require much more time for the participants and a larger scale study. As a convention alongside this section, risks are typed in underline and management strategies in *italic*.

5.5.1   ETHICS RELATED RISK

The analysis shows that ethical concerns become a primary concern with the adoption of gamification techniques in teamwork business workplaces. (Berdichevsky and Neuenschwander 1999) argued that persuasive technology must not misinform people. In the risks proposed in **Section 5.4**, it seems that misinforming staff about the quality of work required to win a reward or the lack of information about the nature of the reward and the strategy to win it might cause ethics related risks such as preserved exploitation. Moreover, the misinformation about the transparency level in the system including the disclosure of the stored data to an external party or colleagues might also create ethical risks about work intimidation in a team workplace when people receive little information about how much of their performance and work behaviour is being inferred through gamification elements.

This research indicates that risks about ethics could be managed through strategies which maximise multi-stakeholders' participation at the design stage of the system in setting up agreements and informing participants about the various elements, e.g. work norms, guidelines and principles of the gamification and its governance. As a result, some participants suggested that strategies like *common ground rules*, *getting everyone involved*, *facilitator*, *voting,*

commitment, and *round robin* could help to maximise staff acceptance of the system and to make them well-informed.

5.5.2   PRODUCTIVITY AND PERFORMANCE RELATED RISKS

These are mainly linked to the actual effect of gamification on the efficiency of executing a gamified task. About productivity related risks, it seems that gamification risks like <u>meet the minimum requirements</u>, <u>lack of engagement</u> and <u>reduce task quality</u> could emerge in the teamwork places as a result of staff poor productivity in the gamified task. Also, performance related risks are linked to the way of accomplishing the gamified task. Risks like <u>freeriding</u>, <u>social loafing</u>, <u>bribe for exchange</u> and <u>performance misjudgements</u> could occur due to group dynamics affected by rewarding groups collectively.

The analysis found that the management strategies of risks related to staff productivity and performance should be defined, planned and agreed at the design stage of the system and implemented during the actual use of the system. At the design stage of the management strategies which support defining rules and making staff informed, e.g. *common ground rules*, *get everyone involved*, *commitment*, and *round robin* are useful for setting up the required level of performance, collaboration and quality of work. Moreover, strategies with a sense of checking and reporting such as *auditing*, *member checking*, *peer rating*, *random monitoring*, *self-assessment*, are useful to review and inspect the teamwork environment and to prevent or alleviate productivity related risks such as lack of engagement and meet the minimum requirements. Also, strategies with a sense of appreciation and controlling such as *reward for helping others*, *acknowledgement of individual efforts*, could assist to prevent or reduce the chance of risks about staff performance in the gamified tasks such as *freeriding* and *social loafing*.

5.5.3   WELL-BEING RELATED RISKS

Gamification embraces various motivation triggers to enhance work environment quality and contribute to staff well-being. The results of this study indicate that risks such as <u>lowering self-esteem</u>, <u>negative pressure</u> and <u>counterproductive comparisons</u> are risks that relate to the adverse

effects of gamification on both work efficiency and staff mental health and well-being. The competitive nature in most of the gamification elements and also the monitoring mechanisms can be seen as the main sources of such well-being issues in the gamified tasks. The analysis suggested that strategies which could help to increase staff privacy like, for example, applying *anonymity* in staff names or performance can help to manage such risks. Moreover, strategies which could help to make staff feel safe about how they are going to be judged in the system using *transparency* strategy or *self-assessment* would increase their willingness to participate in the system and reduce the negative well-being effects.

5.6   RISKS MANAGEMENT STRATEGIES: SIDE EFFECTS

Besides the benefits of the management strategies to mitigate gamification related risks, they may trigger further side-effects requiring further management or at least awareness. For example, a participant mentioned that "*rotation sensitivity strategy can help to alleviate risk in relation to <u>clustering teams</u> based on staff performance in the task; however, such rotation might create a risk to the business by reducing the overall quality of work when good staff members do not fit their randomly allocated teams*". Stakeholders involved in the decision-making to configure the application of the management strategy should consider side-effects and, at times, have to decide whether to accept the risk or the side-effects of managing it through a certain strategy. The main side-effects identified in the study are related to (i) disrupting group coherence (ii) introducing unwanted stress and pressure (iii) adversely affecting competition and collaboration. The three cases are explained through the following points.

- *Transparency* as a management strategy might help to manage risks about staff performance in the system. However, it may introduce alternative risks such as <u>clustering staff</u> in the teams based on their level of performance. Moreover, it may add additional <u>unwanted stress</u> to staff by showing them their level of performance compared to others although they may have different timing and styles of concentrating their effort.

- *Peer-rating* as a management strategy might help to prevent risks about staff engagement in a task. However, it might have a negative effect on <u>team coherence</u>. A participant suggested

applying *anonymity* strategy together with *peer-rating* strategy to minimise the negative effect *peers-rating* strategy might cause to the team.

- *Anonymity* as a management strategy might help to manage risks introduced to the teamwork as a result of the *transparency* in manager's feedback of team individual performance, e.g. announcing, in a call centre, that top performers got between 95% and 99% positive customers rating without naming them while such anonymous announcement sets up the expectation and benchmark for the group. However, it might have negative effects on the right level of competition for staff that are only privately acknowledged for their performance.

5.7   SUMMARY

This chapter has explored management strategies from both psychological and management perspectives, which could help to introduce gamification system into the work environment more healthily and coherently. The study led to 22 teamwork negative affect management strategies which could help to minimize workplaces negative impact related to gamification. Also, categorisation of these strategies into three main aspects based on their goal, stage and purpose of use. Finally, a map between those management strategies with the identified gamification risks in **Chapter 4**.

6. CHAPTER 6: GAMIFICATION RISKS ON TEAMWORK ENVIRONMENT: MANAGEMENT STRATEGIES MODALITIES OF APPLICATION

Despite the benefits of gamification, its application in an enterprise has potential risks as discussed in **chapter 4**. For example, the way of calculating, assigning, and displaying rewards may increase the chance for adverse work ethics including free-riding, work intimidation, and lack of group cohesion (Forsyth 1992, Shahri et al. 2014).

The results of this chapter are built on findings presented in **Chapter 4** which focused on conceptualising the main risks and risk factors of gamification systems to the teamwork within an enterprise. Also, build on findings presented in **Chapter 5** regarding a set of management strategies for managing gamification risks. This was meant to develop the main contribution of this research, which revolves around two key aspects. The first one relates to the various modalities of applications of such management strategies. This includes the different purposes of usage, styles of applications, timings and stakeholders. The second one relates to the proposal of a checklist tool, which is meant to help stakeholders in the decision-making session to identify and resolve gamification risks. In doing so, a significant step towards a systematic method for the elicitation, assessment, and mitigation of gamification risks to teamwork within enterprises will be achieved.

6.1 RESEARCH GOAL

This chapter will build on previous results discussed in **chapter 4** and **5**, in which gamification risk factors and exemplar of risks discussed in **chapter 4** and the most applicable management strategies to manage these risks proposed in **chapter 5**. The aim is to identify different modalities of application of the management strategies in relation to the purpose of application, style, timing and various types of stakeholders to be involved in the decision-making session to decide the applicability of the management strategies for the identified or predicted gamification risks. Finally, this chapter aims to propose a checklist tool to facilitate the risk identification process. To sum up, this chapter is meant to propose two main findings: (i) modalities of

application to help for better application of the management strategies to manage gamification related risks, and (ii) checklist tool to help stakeholders to identify or predict gamification risks.

6.2 RESEARCH METHODOLOGY

This research builds upon previous work in which five main risk factors of gamification system were identified in **Chapter 4**, and a set of 22 management strategies to manage gamification risks were proposed in **Chapter 5**. The studies in this chapter were designed for two main purposes: (i) configuring the best application of the management strategies proposed in **Chapter 5** to manage gamification risks (ii) and to identify stakeholders that should be involved in the decision-making process to decide upon the application of the management strategies. To achieve that, two focus groups were conducted, each to satisfy the purpose (i) and (ii) respectively. The first focus group involved seven participants from diverse backgrounds shown in **Table 15**. At the start of the focus group, participants were given a presentation to familiarise them with the context of the study problem. Also, they were given scenarios to get immersed in the problem and its context. The second focus group was made of nine participants with various years of experience in gamification in which some of them are researchers while others are belonging to business workplaces. In each scenario, a specific gamification risk was discussed followed by some questions on how to manage the risks. Finally, ten interviews with call center agents, managers and experts in related fields were conducted in order to refine the final set of results. All of the interviews followed a semi-structured style.

As a research methodology, this chapter adopted several qualitative methods to map between these results in the literature and to generate an in-depth understanding of how management strategies can be applied to manage gamification risks. In empirical research, building qualitative research upon qualitative research can be used for further investigations (Creswell 2014). This is also to increase the diversity and credibility of the results. Two main stages were involved in the research. The research materials used in these studies are present in **Appendix 3.**

6.2.1 SECONDARY ANALYSIS STAGE

In the first stage, secondary analysis of the results gathered from the previous studies was conducted. In these results, an observational study in two large business companies was conducted to observe various situations where gamification risks can emerge in a teamwork environment. Also, fifteen interviews with people from the same workplaces were conducted. Moreover, a variety of roles was selected to get diverse viewpoints, e.g. managers, supervisors and call centre agents. The main focus of the secondary analysis, conducted for this chapter, was to identify various situations where gamification risks need to be managed and the negative side-effects of such management. This resulted in generating various scenarios in which each scenario is representing a typical situation where gamification negative consequences should be managed. These scenarios were then used as a material for discussion in the following primary studies.

6.2.2 PRIMARY STUDIES STAGE

The two main purposes of this second stage were the (i) mapping between the gamification risks discussed in each scenario and the set of management strategies and (ii) the identification of best modalities to apply these strategies. To achieve that, two focus groups were conducted, followed by ten interviews for confirmation and further insights on the results.

6.2.2.1 FOCUS GROUPS

Two focus group sessions were conducted, each with a different focus. The first focus group was mainly to map suitable management strategies with gamification risks. Also, participants were asked to identify different modalities of application of the management strategies to manage the risk in the scenarios. Seven participants were selected from various related backgrounds (one academic expert in gamification, two persuasive technology designers, two software engineers and two gamification end-users working in a business company). At the start of the focus group, participants were given a presentation to familiarise them with the context. They were also given scenarios to immerse them in the problem and its context. In each scenario, a specific gamification risk was discussed followed by some questions on how we could manage the risk. The session lasted two hours and 15 minutes.

The second focus group consisted of nine participants with various years of experience in gamification solutions within business workplaces and various roles, e.g. managers, supervisors, IT designers and call centre agents. They were selected based on pre-designed criteria to ensure diversities on ages, genders and experiences in such systems. The main focus of the study was to refine the results of the first focus group with people from business workplaces background. They were asked to comment on the results of the first focus group. There was a specific focus on the side-effects of the management strategies from their perspective. This session lasted one hour and 45 minutes.

6.2.2.2   INTERVIEW

Finally, the results of the analysis of the focus groups were used to design interview questions with the aim of getting further confirmations and insights from participants working in different business environments applying gamification practices in their workplaces. The questions were split into three categories to understand (1) *when* the management strategies for gamification risks need to be applied, (2) the strategy purpose, e.g. to resolve, alleviate or prevent the risk, and (3) in which style, e.g. directly implemented or collectively. The questions were sent to participants in advance, and they were given 20 minutes' induction before each interview. All of the interviews followed a semi-structured style. Each interview lasted for around 35 min on average.

6.2.3   ANALYSIS

Focus groups and interviews were audio recorded and transcribed. The data collected were content analysed according to the six phases of thematic analysis proposed in (Braun and Clarke 2006c). For the mapping of the management strategies with different categorisations, a card sorting approach was used mainly in the focus groups. The mapping was also discussed during the interviews. The credibility of the findings was increased through doing reviewing the analysis by the authors' team as well as members checking. Participants were fully informed about the study and their consents were collected. Participants received £15 as a gift for their time. All studies were reviewed and approved by the ethics committee of the institution of the authors.

Research Method	Description
Focus group	Seven participants with multi-disciplinary including requirements engineering, human computer interaction, user modelling, cyber psychology and business management
Focus group	Nine participants from business companies, four call center agents, one project leaders, one business consultants, two IT designers and one system analysts
Interviews	Ten interviews with participants from related business workplaces

6.3 MANAGEMENT STRATEGIES: MODALITIES OF APPLICATION

The results of the analysis of the data gathered from studies in **chapter 4** and **5** were used to design the materials of the studies of this chapter. Two focus groups followed by ten interviews were implemented to explore four main phases in relation to the applicability of the management strategies proposed in **chapter 5** to manage gamification risks presented in **chapter 4** including: (1) the main purposes of the application of the management strategy (2) the way to apply them to manage the risk (3) the applicable timing and (4) the related stakeholders. As a result, different modality aspects in relation to the application of the management strategies for gamification risks in teamwork environments were identified. The representation of modalities revolves around the following four areas and presented in **Figure 12.**

- Management strategies: application purposes;
- Management strategies: application styles;
- Management strategies: application time and
- Management strategies: Stakeholders

6.3.1 MANAGEMENT STRATEGIES: PURPOSE OF USE

Two main purposes of the management strategies were identified to manage gamification risks; identification purpose and mitigation purpose.

6.3.1.1 RISK IDENTIFICATION STRATEGIES

Risk identification strategies are meant to specify threats and limitations in the gamification system. By using such strategies stakeholders including analysts and managers can identify risks or predict their possibilities to occur in the workplace. Participants suggested that strategies for risk identification could be applied at the early stage of gamification deployment or even design. They emphasised strategies like *get everyone involved* and *round robin* could help to identify risks at the design stage by allowing all stakeholders to involve in the design session, e.g. participatory design (PD) (Kensing and Blomberg 1998), and give them an equal chance to comments on the design and logic. This could help to identify risks which can be introduced to the workplace as a result of the societal and personal factors, e.g., the identification of diversity of experiences and capabilities in the team and goals related risk factors e.g. goal difficulty as perceived by some team members.

When gamification is already running, strategies with a sense of revision and inspection like *auditing* and *storytelling* about experiences with it could help to identify risks and sources of the risks in the gamified tasks in team workplaces. A manager participant stated: "*I sometimes ask staff to tell the situation in a story to identify the risks or the reason behind it*". Furthermore, *random monitoring* and *managerial level monitoring* are management strategies with a sense of risk identification by regularly checking the system results.
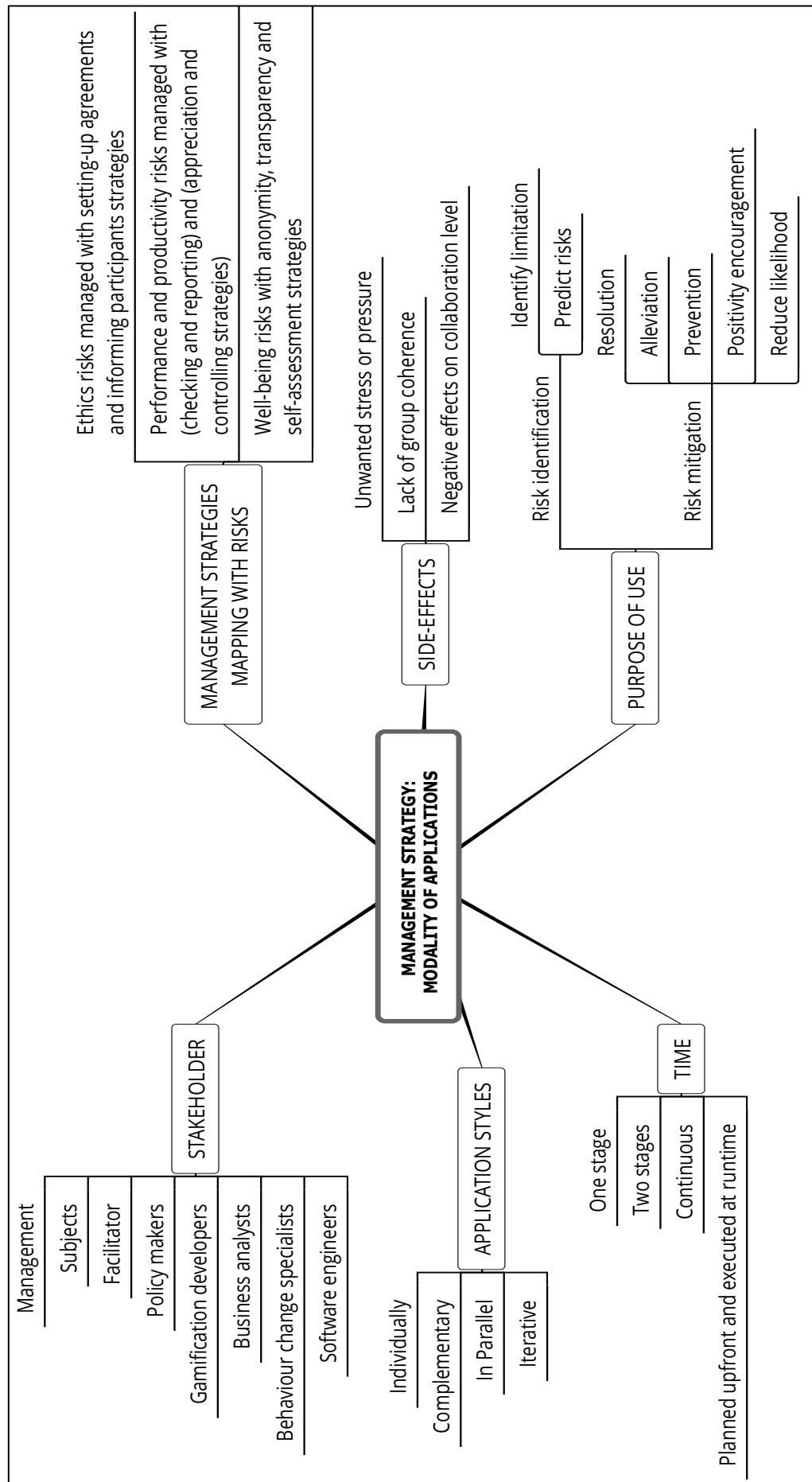
FIGURE 14: GAMIFICATION MANAGEMENT STRATEGIES RELATED MODALITIES

6.3.1.2   RISK MITIGATION STRATEGIES PURPOSES

This sub-section discusses various applications purposes of the management strategies to mitigate gamification risks on teamwork environment (see **Figure 13**). Participants agreed on the following purposes to mitigate gamification risks;

- **Resolution**: the goal of these strategies is to resolve the negative effects of risks on teamwork. Strategies with a sense of exchanging interest, making attractive offers, rewarding agreements and recognition could help to resolve gamification risks. For example, some performance related risks such as <u>freeriding</u> and <u>social loafing</u> can be resolved by applying strategies like *rewards for helping others* and *rewards for individual contribution.*

- **Alleviation**: applying some strategies could help to reduce the negative effect in the workplace when it happens eventually and cannot be prevented. Strategies with the characteristic of intervention or mediation could help to reduce the severity of some risks. some experts involved in the interview study commented that strategies such as *random monitoring* or *anonymity* cannot help to resolve conflict, but it might assist to reduce the negative effect, For example, *anonymity* strategy can help to alleviate risks of gamification teamwork as a result of *transparency* in staff performance.

- **Prevention:** strategies with the sense of setting up the agreement, making staff informed, specifying objectives and defining policies and rules such as, *common ground rules* and *commitments* can be applied at the design stage of the system to prevent risks like <u>work intimidation</u> and <u>anchoring bias</u>. This can be done by involving team members in the early steps of developing and configuring gamification and giving them equal chances to comment on how the system should be running and defining the acceptable behaviours this would help to prevent ethics related risks from occurring in the team environment.

- **Positivity Encouragement**: some strategies could help to encourage positivity even if risks are anticipated. Participants mentioned that strategies which have the characteristics of appreciation could help to encourage positivity in the team work and act as precautionary measures which enhance the work atmosphere and deter risk factors. For example, applying *acknowledgement of individual effort* strategy within the team could assist team

members to increase their individual contribution in the tasks. Thus, the team coherence and level of performance in the gamification system would not be affected when goals and tasks are collective. Also, a participant emphasised, "*acknowledge and reward agreement would help to increase team acceptance of such a system and encourage positivity*". This means that some management strategy can be used not only to resolve the risks but also to motivate positivity and create a sense of fairness so that need to flag gamification related issues, if they happen, is minimised.

- **Reduce likelihood:** the analysis identified that understanding the risk factors and their sources could help to reduce the likelihood of the emergence of the risks in the team workplace. Strategies which support regular modification or updating monitoring and rewarding strategies could help to reduce the likelihood of some teamwork risks. For example, a strategy like *rotation sensitivity* where staff should be allocated and moved randomly between teams could help to reduce the likelihood of risks related to societal and personal factors such as clustering around staff experiences and capabilities.
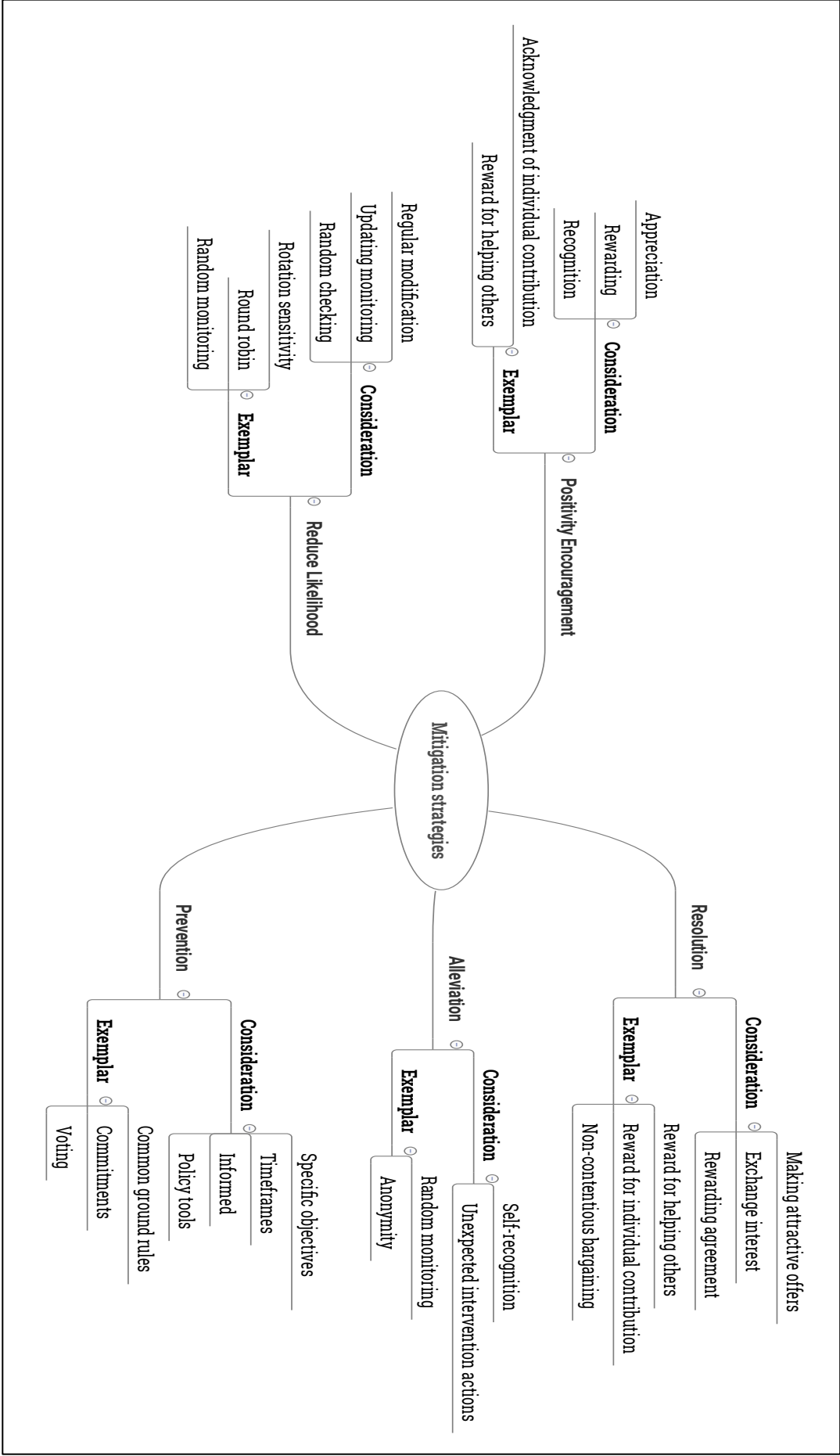
FIGURE 15: MITIGATION STRATEGIES PURPOSES

6.3.2   MANAGEMENT STRATEGIES: APPLICATION STYLE

There are different application styles for management strategies and each would depend on the type of strategy, risk and management styles. The analysis of the result found that the decision about these styles should happen after deciding the main purpose of the management strategy. Four main styles of applying risk mitigation strategies were identified (see **Figure 14**):

- **Directive:** refers to strategies which could be implemented separately to manage a specific gamification risk. Strategies which have well-defined objectives and clear directions can be run individually. For example, some participants suggested that managers can play the key roles in resolving negative effect within some scenarios through leading the observing or auditing process. Most of the observation strategies can be executed individually to manage the risks. For example, strategies like *random monitoring* can be used for observing the work environment to check staff performance in the gamification system. The automated ability in the gamification system allows managers to set fixed automated feedback based on automated measurement of staff performance and then run the strategy separately by itself to manage risks related to staff performance in the gamified task.

- **Complementary:** strategies for collecting agreements and setting up rules are candidates for being applicable collectively for effective risk management. When we *get everyone involved* at the design stage for giving all stakeholders a chance to comment on the design of the system or on the management strategy, we could also apply *round robin, voting, facilitator* strategies to ensure fair participation that would help for better results in the risk management and then apply *commitment* strategy on the final results.

- **Moderated:** this approach would help with strategies which are complex and where workers are not able to steer the process to reach the consensus. External authorities or experts work collectively with managers to set up the strategy and moderate the interaction. For example, in the *external party* strategy managers work together with external consultants to decide the effective way to manage the strategy to resolve the negative effect of the gamification element in the teamwork.

- **In parallel**: refers to the possibility for some strategies to be applied in parallel with another strategy for effective risk management. The analysis shows that strategies which

could also be used to reduce the side effects of other strategies are a candidate to apply in parallel with them, e.g., the application of *self-assessment* with *random monitoring* and the application of *anonymity* strategy with *transparent* strategy. A participant suggested that "*it is always better to apply self-assessment with other checking and reporting strategy*". Applying *self-assessment* strategy with other checking and reporting strategies could help staff to check their own performance before they are being judged or measured by others. This would help to make staff informed about their level of performance and try to maintain it before final judgments are made. For example, risks like <u>meet the minimum requirement</u> and <u>lack of engagement</u> in a task could be managed using *peer rating* strategy. However, to minimise the side-effects of such strategy participants suggested applying *anonymity* strategy with *peer-rating* strategy to avoid creating tensions and affecting group coherence.

- **Iterative**: the analysis indicates that some risks can appear only after a while and due to reasons like the <u>novelty effect</u> and also because of other personnel joining or leaving the team or changes in the management style and task types. Thus, *random monitoring* and *rotation sensitivity* both are repeatable strategies for better risk management even if there are low indicators of any risk. Risks like <u>novelty effect</u> can be effectively managed with an iterative type of management strategies. Applying such management strategies could help staff to keep motivated in the system by rotating them to different teams with different motivation techniques from time to time. This would help to alleviate <u>novelty</u> side-effects. Moreover, as mentioned in **Section 5.4** risks which can exist in the workplace as a result of factors like, staff membership time in the team or staff with different experiences and capability in the same team can be managed with iteration type's strategies.
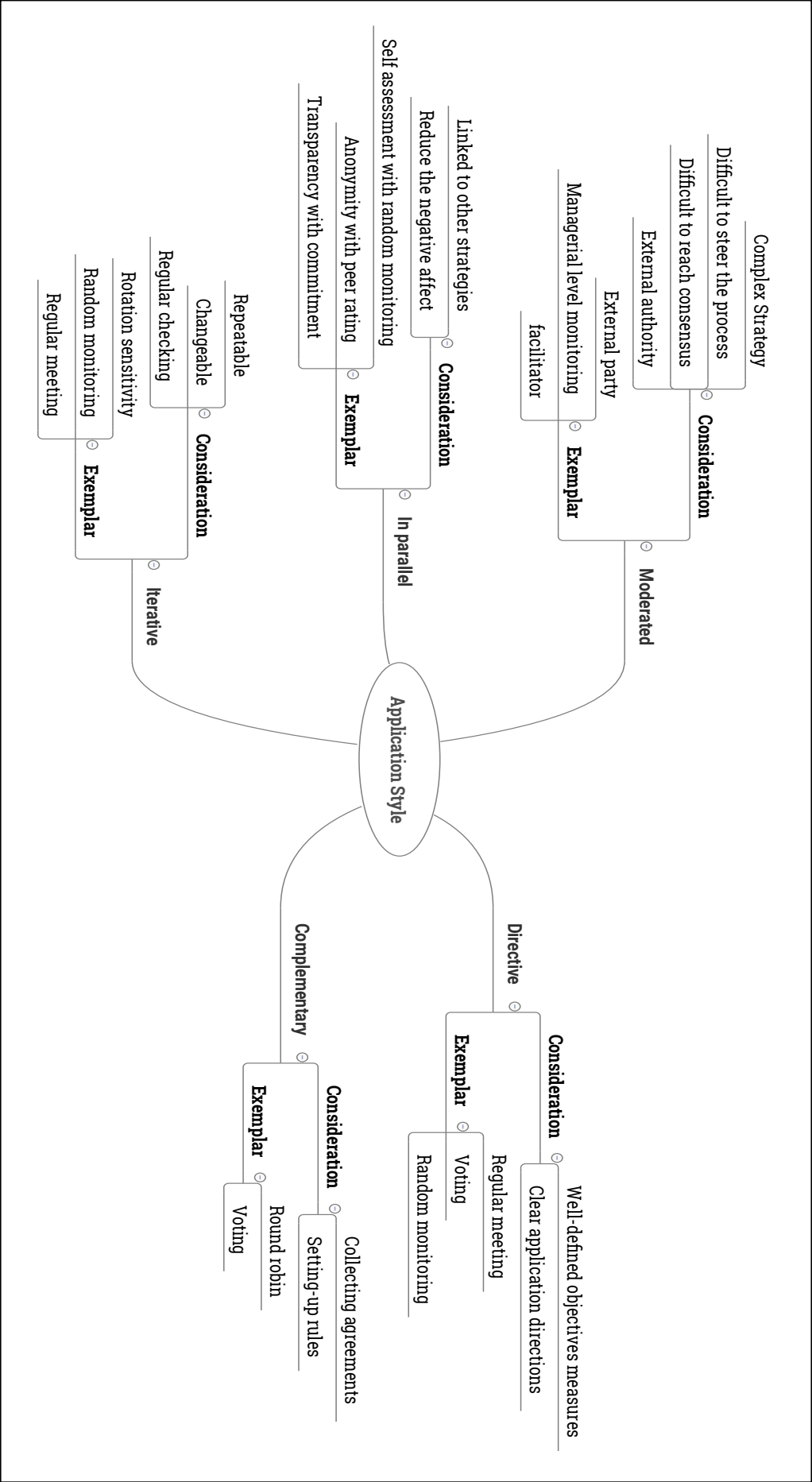
FIGURE 16: MITIGATION STRATEGIES APPLICATION STYLES

Application Style

- Moderated
  - Consideration: Complex Strategy; Difficult to steer the process; Difficult to reach consensus; External authority
  - Exemplar: External party; Managerial level monitoring; facilitator
- In parallel
  - Consideration: Linked to other strategies; Reduce the negative affect; Self assessment with random monitoring
  - Exemplar: Anonymity with peer rating; Transparency with commitment
- Iterative
  - Consideration: Repeatable; Changeable; Regular checking
  - Exemplar: Rotation sensitivity; Random monitoring; Regular meeting
- Directive
  - Consideration: Well-defined objectives measures; Clear application directions
  - Exemplar: Regular meeting; Voting; Random monitoring
- Complementary
  - Consideration: Collecting agreements; Setting-up rules
  - Exemplar: Round robin; Voting

6.3.3 MANAGEMENT STRATEGIES: APPLICATION TIME

Regarding time, the management strategies can be applied at different stages of the gamification system lifecycle. Three main classifications of implementation time were identified (see **Figure 15**).

- **One stage strategies:** Strategies with a sense of setting up agreements, informing participants and structuring the general guidelines suit to be implemented as one stage application. This could be implemented once in advance at the design stage of the system. Repeating them when new team members join is still possible, but this can be then seen as setting up the rules again for a new team. For example, some practitioners and psychologists mentioned that we should *get everyone involved* in a discussion making a session at the design stage and make them committed to the design of their gamification element. Moreover, the analysis results suggest that strategies with characteristics like observing and controlling the environments would fit as one stage strategies at the run-time of the system. For instance, strategies such as *auditing*, *random monitoring*, *peer-rating* and *member-checking* could help in teamwork to observe the quality of the work and to control and resolve negative effects when they happen.

- **Two-stage strategies:** refers to strategies which could be useful in both at the design time and also at the runtime stages of the system. Strategies with a sense of facilitating the application of other management strategies would suit a two stages application process. For example, a *transparency* strategy can be applied at the design stage where the participant should be informed about everything related to the system e.g. the goals and the reward strategy. Also, it can be implemented at runtime stage where staff can be aware of their performance level captured by the automated monitoring.

- **Continuous strategies:** this refers to strategies which can be started at the design stage and continually implemented at the runtime stage. In particular, strategies with continuous benefits would be more helpful when they are being continually applied in the workplace. For example, the *external authority* strategy can be used at the design stage for the setup of

an agreement process and also then be continually applied to supervise and review the actual implementation of the strategies at the runtime of the system.

- **Planned in advance and executed at runtime strategies:** there are situations in which some strategies could be decided, planned and agreed at the design stage as corrective measures and then executed at the right time at runtime stage for better risk management. Strategies which require prior decisions and agreements over the way of their implementations are suited for such type of application. For example, participants involved in the focus group suggested that to manage novelty effect risk, stakeholders involved at the design stage of the system could plan and agree on the way of applying *rotation sensitivity* strategy, e.g. when to move staff between teams and based on what.
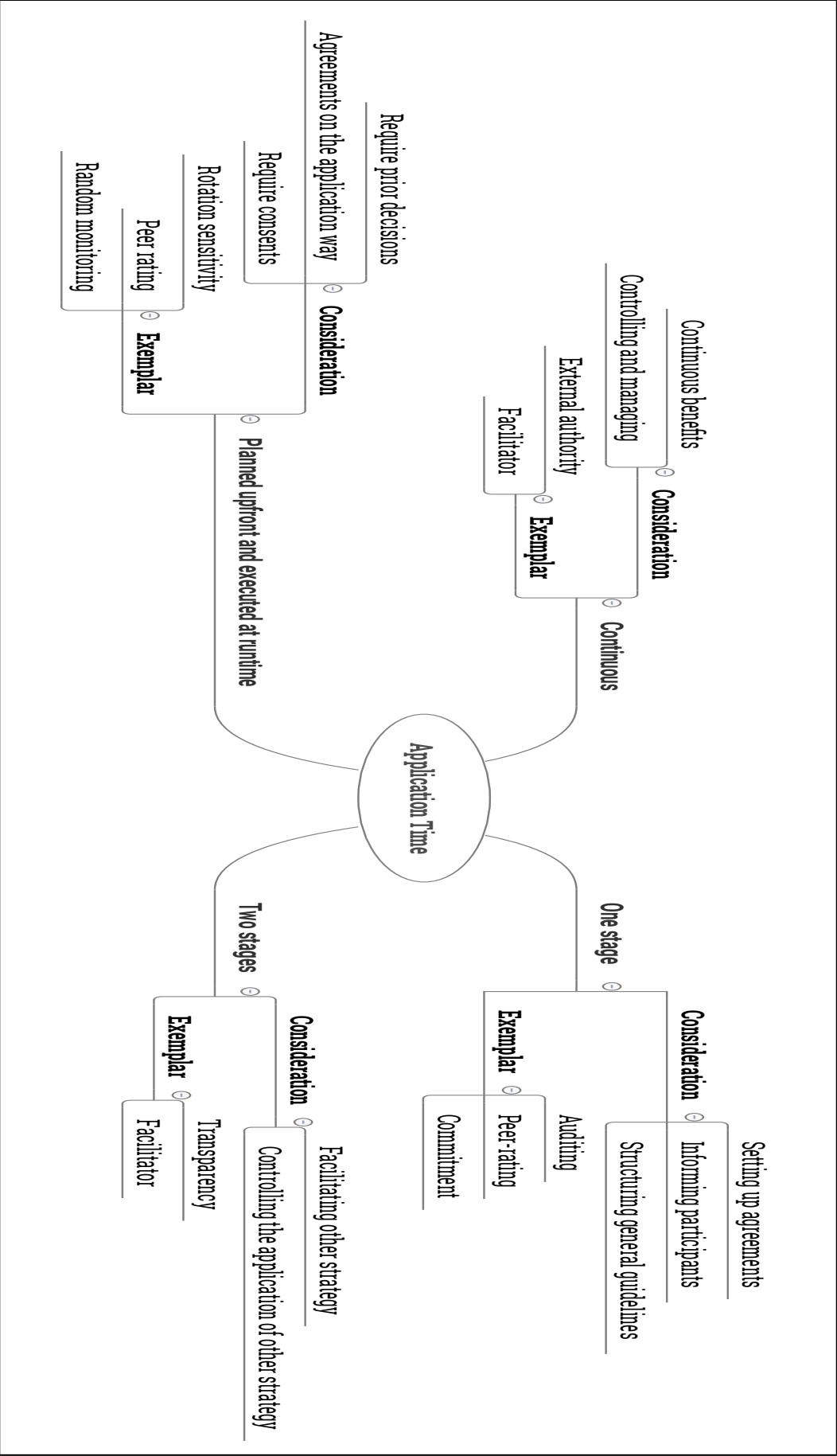
FIGURE 17: MITIGATION STRATEGIES TIME

6.3.4   STAKEHOLDERS

Stakeholders have been defined as "all those identifiable groups or individuals on which the organisation depends for its survival, sometimes referred to as primary stakeholders: stockholders, employees, customers, suppliers and key government agencies" (De Colle 2005). In this research, stakeholders are people who should be involved in deciding and conducting management strategies to identify and reduce gamification risks. In Clarkson principles of stakeholders' management, it was argued that managers should listen, communicate with all stakeholders to take all of their interests and concerns into account in the decision making process (Ethics 1999).

In this section, stakeholders who should be involved in the decision-making session about management strategies for gamification risks in teamwork environment are identified. One primary aspect of the focus group study, listed in **Table 15**, was to identify the stakeholders of the management strategies. The participants were given scenarios explaining various cases where gamification risks can emerge. Also, they were given a separate list of potential stakeholders which were proposed from related research (Herzig et al. 2015, Shahri et al. 2019). Participants were asked to recommend and give their insights - either from the list or from their own perspective – about the stakeholders to be involved in each scenario in order to decide and configure the risk management strategies. Also, they were asked to recommend the main roles of the identified stokeholds within the decision-making session. The analysis suggested that the set of identified stakeholders shall be engaged in a decision-making session to configure and decide the management strategies from the early stage of the gamification development process. Those stakeholders and their roles in the session are discussed in the following points and summarised in **Table 16**:

- **Management**: this can be done by managers, supervisors or project leaders. The role of the management stakeholders is to decide which of the other stakeholders should be involved in the decision-making session. Also, they are responsible for ensuring that the application of the management strategies would not have side-effects on the achievement of the business goals. In addition, the analysis suggested that management stakeholders are responsible to govern and guide the application of the management strategies during the

actual implementation of the gamification system in the workplace. This includes deciding who is responsible for running the strategy e.g. *peer rating* and *random monitoring,* and how they should be implemented in the workplace. For example, they can specify when to use *peer rating* strategy and who should be rating whom within the team. Also, they should specify when the auditing and reporting strategy type requires applying an *external authority* strategy to manage risks which cannot be managed internally. Some participants emphasised "*the need to have the external authority to ensure fairness in the way of applying the observation strategies alongside the management and supervisors*". This is to avoid management bias.

- **Subjects**: this type of stakeholder is related to people who are meant to experience gamification and who are being affected either negatively or positively by its application in the workplace. Based on the business context of this research, the subject stakeholders are staff users. Their role in the decision-making session revolves around assessing the ability to achieve the goals of the gamified task in the work environment. Also, depending on business context and the given situation, they should participate in the identification process of gamification risks and cooperate with other stakeholders to better decide the application style of the potential management strategy to manage the identified risks.

- **System analysts**: their role is to provide rich information on the possibility for some management strategies to be embedded within the design of the gamification system together with the enterprise information system and its business process. They can also advise on the feasibility and fitness of the application styles to manage gamification risks given the existing computing infrastructure and architecture. For example, they can contribute to shaping the way of applying automated *random monitoring* strategy and the automated managers' performance feedback on the gamification element in terms of frequency and granularity. Also, they can provide information regarding an alternative design of the gamification system when risks management strategies may not be possible without side-effects. For example, they may suggest leaderboards visibility to be one time only to avoid people constantly checking to see their rank and making negative comparison and work intimidation.

- **Facilitator**: their main role is to facilitate the decision-making session and ensure the involvement of all stakeholder or their representatives in the risk elicitation and management sessions. They are also responsible for managing the *voting* management strategy if stakeholders agree to use such strategy during the sessions. At the end of the session, the facilitator should ensure all stakeholders involved in this session should give their consents and *commitments* on the decisions made. Interestingly, some participants expressed that the facilitator role should not be played by the management stakeholders, but rather by an external party as a facilitator. This can help to maximise various participants' opportunity -especially staff- to fairly and openly add their insights into the design of the gamification elements and the risks management strategies.

- **Policy makers**: as discussed in **Section 5.5.1**, gamification ethical risks can be managed by applying management strategies which can help to make participants informed about the policies and the rules from the early stage of the system. As a result, policy makers should ensure appropriate measures in terms of the ways agreements are set up, and participants are informed they should manage risks in relation to ethics in the gamification workplaces. Also, they should provide insights and recommendations on the legality of the modality of applying the checking and reporting management strategies. The participants also reported that they should contribute on the risks identification process as well to identify risks around related aspects such as risks that might be introduced to the workplace because of the rewarding strategy or the performance measurement policies.

- **Gamification developers**: are people responsible for designing games or gamification elements. Their main role in the risk identification and management sessions is to provide insights regarding the negative effects of the application of the management strategy to the gamification system effectiveness and feasibility. They also need to be knowledgeable in game design methodologies and tools (Herzig et al. 2015). For example, a management strategy could entail measuring performance automatically where gamification developers shall assess the possibility to do that using current technology without disrupting users' experience.

- **Business analysts**: they are responsible for providing a clear understanding of the economic costs of the application of the management strategy. For example, the cost of the regular application of *external authority* as a management strategy can be high and, hence, they can advise on the cost and the ability of that the organization to cover the cost and whether to join this process with other existing processes such as external mentorship which may be already in place for staff.

- **Behaviour change specialists**: participants agreed on the need for a stakeholder with psychological knowledge to participate in the decision-making session. Their roles are to contribute to the identification of the expected behaviours when applying gamification elements and the behaviour after the application of the management strategy. Also, they can contribute on the risks identification process by identifying the predicted behaviours within the gamified task. This is important for the teamwork environment and expertise in social psychology and group dynamics would be essential.

TABLE 20: STAKEHOLDERS MAIN ROLES

Stakeholder	Role Description
Management	Managers, supervisors or project leaders who are responsible for identifying other stakeholders to be involved in the risk management decision-making session. Also, they are responsible for confirming the process of running and managing the checking and reporting management strategies while gamification is running.
Subjects	They are the people who are going to experience gamification in their job. A diverse sample of such gamification users should be involved in the decision-making session. Players' types (socializers, free spirits, explorers, achievers, players, disruptors and killers (Marczewski 2015) can be the basis for selection in addition to diversity in ages, gender, capabilities and experiences.
Facilitator	This role refers to the people facilitating the sessions and the use of voting management strategy if needed. Also, they should ensure equal and fair participation of the various stakeholders involved in the session. It's advised to select the facilitator from an *external authority* as one of the management strategies for some kind of risks. This is to increase impartiality and openness in opinions.
Policymakers	They play the main role in management strategies regarding setting up

	agreements and informing participant to ensure that the policies are well-designed to reduce ethics related risks and be aligned with the overall management strategy of the organization in relation to quality assurance, communication protocols, trust, transparency amongst roles and so on.
Gamification developers	Their role in the decision-making session is to contribute to the possibility of the management strategy to affect the gamification system and the ability to accommodate it in the design of the system.
Business analysts	They provide business-related insights on the suggestion and the application of the management strategies in terms of their costs and possibility to integrate with existing processes and procedure.
Behaviour change specialist	Recommendations about the effects of gamification elements as well as their risks management strategies on people behaviours within a team workplace and recommendations about optimizing them.
System analysts	To check the possibility of any solution to be part of the design of the gamification system and its underpinning enterprise information system and computing infrastructure and architecture.

6.4   DISCUSSION

Despite the recognition of gamification risks in principle (Fogg 2002a, Versteeg 2013, Raftopoulos 2014, Shahri et al. 2014), there is little research on concretising such risks and their mitigation strategies. The research explored gamification risks together with recognition of the social aspects (e.g. social structures and roles), the dependency between actors, personality traits, tasks and goals. Also, a taxonomy of gamification risk factors was proposed to give a more concrete view of them. Although the discovered risks were linked to their main sources in the gamification system, acknowledge that there was some overlapping in relation to their main sources in the system. This indicates the level of complexity in identifying and managing the risks of such systems and demonstrates the need for well-established risks assessment and elicitation methods. This research, therefore, revealed the need for a systematic approach for gamification risk management within an enterprise in general, and within a teamwork environment in particular.

Related literature (Boehm 1991) and participants' comments emphasized the need to examine the system where gamification is to apply as early as possible in the development process in order to manage risks starting from the analysis of gamification including the decisions of the tasks to be gamified, monitoring and performance management strategies and rewards system. The analysis also suggests that risks management strategies cannot be separated from such analysis and should not be delayed until gamification is designed and integrated.

In (Morschheuser et al. 2018) one of the common principles for engineering gamification systems is to have a continuous monitoring to ensure that the system is delivering the required level of user engagement and motivation. Likewise, the results suggested to continually apply some mitigation strategies such as the *random monitoring* strategy under management responsibility with regular involvement of external authority. This will help to maintain the effectiveness of the system and reduces the chance of some gamification risks e.g. social loafing and free-riding.

According to (Boehm 1991), a primary principle of designing gamification is to have a profound understanding of users, particularly of their goals and needs. Similarly, the results expressed the need to involve staff as a key stakeholder in the design stage of the gamification system in order to discover and address their related risks and involve them in the decision-making of the management strategies.

Participants involved in the interviews emphasized the need for careful and informed decisions to implement a management strategy to manage risk in the system especially when they integrated either transparency or autonomy features as this might destroy the whole system. The risk identification process is seen as an iterative process to allow for continuous discovery and determination of the gamification risks either at the design stage of the system or during the production time stage. Alongside the proposed checklist for risk identification and management, I found in the literature other approaches which could support the decision in such a process. For example, the Delphi method (Okoli and Pawlowski 2004) is a well-known tool in information system research for identifying shortcuts based on several rounds of debates. However, the Delphi method is commonly presented in the literature for collecting experts' agreement on specific issues while the discussed checklist and its elements are meant for

experts, managers, developers, analysts and staff. Hence, a different way of managing the debate and discussions would be required. There is a genuine need for such a mixture of stakeholders given the nature of gamification and its inherent relation to how staff perceived it.

6.5 SUMMARY

This chapter argued that gamification in enterprises shall undertake a risk assessment and management process to cater to its potential side-effects on teamwork. To bridge the gap, the proposed results in this chapter and previous chapters are meant to take the primary steps towards proposing a theory-informed method of gamification risk assessment. To form the basis of the method, this chapter was built upon and extended previous works on management strategies for gamification risks and the taxonomy of risk factors and exemplar risks proposed in **chapter 4** and **5**. In addition, this chapter focused on the best application of these management strategies for a well-managed and healthier implementation of the gamification system in a teamwork environment.

As a method, this chapter conducted several qualitative studies including expert interviews, an observational study and focus groups supported by card sorting technique to establish a taxonomy of risks, their factors and management strategies. By analysing the collected data, this chapter identifies different modalities of application of the management strategies and various types of stakeholders to be involved in the decision-making session to decide the applicability of the management strategies for the identified or predicted gamification risks. Finally, this chapter proposed a checklist to facilitate the risk identification process. This was meant to answer the research main questions about (i) how to identify gamification related risks, and (ii) how to manage them for best application of the system in the teamwork context.

Given the ethical considerations associated with gamification and its human-intense nature, this research recommends using participatory decision style as an approach for future methods that focus on the analysis of gamification risks and their resolution. Hence, employing

techniques such as role-playing and scenarios may help to explore and uncovering ethical concerns through groups discussions and prototyping exercises.

This research intends to utilise the results presented in this chapter and develop a method for gamification risk management that includes risks detection and assessment alongside with their mitigation strategies from the early stages of the system analysis.

7. CHAPTER 7: GAMRISK: A METHOD FOR GAMIFICATION RISK IDENTIFICATION AND MANAGEMENT STRATEGIES

Successful software design is the one which can identify potential risks and try to manage them before and after the occur (Dey et al. 2007). As it was mentioned in the literature review part of this thesis that although the literature has several methods for risk identifications process such as scenarios, brainstorming and examination of past situations, there is still lack of a good mechanism to help project managers for potential risk factors identifications (Schmidt et al. 2001). As a result, this chapter built on top of the proposed findings of the previous chapters in order to develop gamification risk identifications and management method.

The **GamRisk** (**Gam**ification **Risk** identification and management) method is a risk assessment method that aims to help software engineers to identify and predict gamification risks at the design stage of the system. Moreover, this method can provide them with a risk mitigation process to cater to potential gamification side-effects in business teamwork. To realise this method, several qualitative studies were conducted, including expert, practitioner, end-user and management interviews, an observational study and focus groups supported by a card sorting technique. By analysing the data collected through these studies, the components of the **GamRisk** method were developed. The method is illustrated in **Figure 17**. Its components were explored in the previous chapters of this thesis. In **Chapter 4,** the main risk factors and risks were explored and published in (Algashami et al 2018). **Chapter 5** primarily aimed to investigate the different management strategies for mitigating these risks and the result was published in (Algashami et al 2017). In **Chapter 6,** modalities of the application were developed for these management strategies for better gamification risk management and published in (Algashami et al 2019). **Figure 16** shows a brief description of the main components of the method and the chapters in which they were discussed.
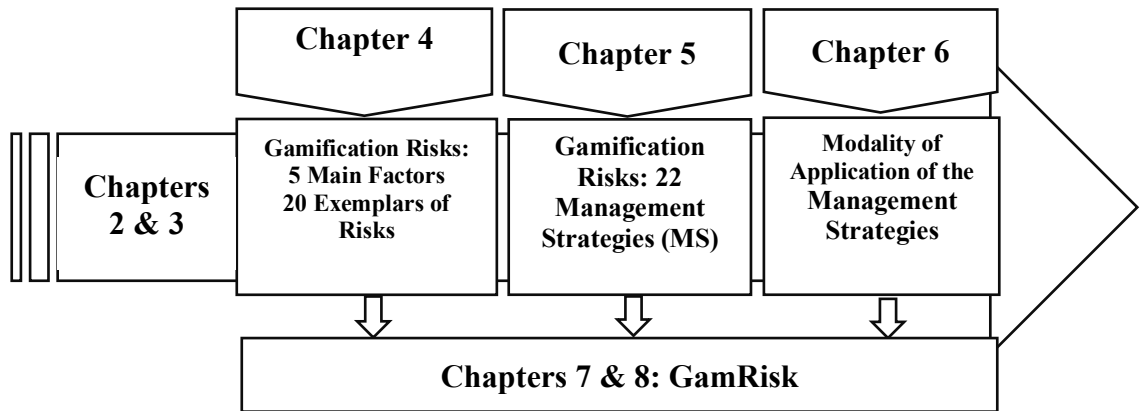
FIGURE 18: GAMRISK DEVELOPING DETAILS

Given the ethical considerations associated with gamification and its human-intense nature, this method will adopt a participatory decision-making style as an approach to the identification of gamification risks and strategies for their resolution. Hence, employing techniques such as role-playing and scenarios may also help in exploring and uncovering ethical concerns through group discussion exercises. This method also allows the involvement of the stakeholders (staff, i.e. the people who are going to use the system) in its activities.

The **GamRisk** method uses four main steps to present its building blocks. These four steps are compiled to form the two main stages of **GamRisk**: (i) the risk identification stage, in which the scope of the risk assessment is identified and the main risk factors in the system are explored; and (ii) the risk mitigation stage, in which different management strategies are applied to different modalities of application to manage the identified risks. The following sections will describe these in more detail.
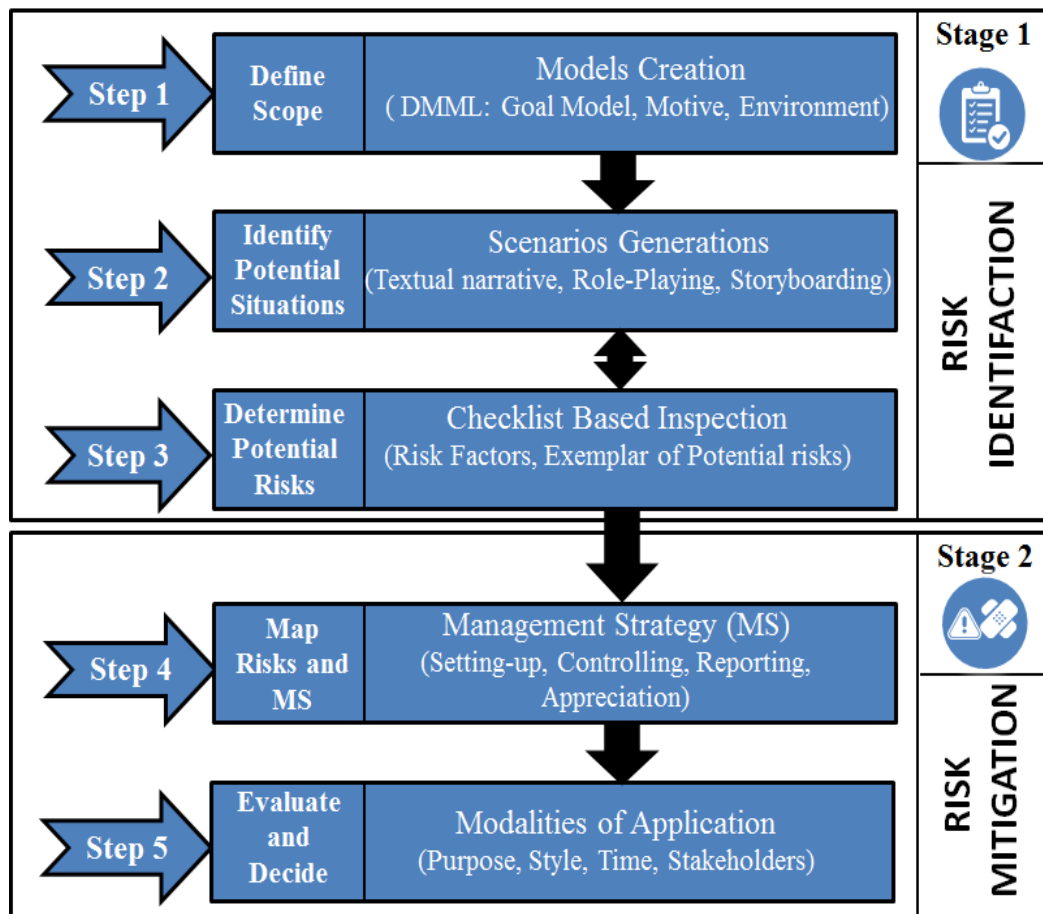
FIGURE 19: GAMIFICATION RISK: IDENTIFICATION AND MANAGEMENT METHOD
(**GAMRISK**)

7.1.1   RISK IDENTIFICATION

The main aims of this stage are to: (i) define the scope of the method, i.e. the organisational model; (ii) identify the main situations in which the risks might occur; and (iii) determine the main risk factors which might affect the gamification system. This stage acts as a baseline in order to define the scope of the risk identification and to start the risk mitigation process in the following stage.

7.1.1.1   STEP 1: MODEL CREATION

Modelling is a widely used technique in the early stages of the software design lifecycle. Requirement modelling is the core step in software planning undertaken by software engineers and can be used to express information or needs. The literature contains various different approaches to modelling business systems. Goal modelling is one of the more well-known approaches for capturing and addressing the stakeholders' requirements of a system. A goal is

"a condition or state of affairs in the world that the stakeholders would like to achieve" (Yu 2001). It can offer a way to represent concepts in socio-technical systems such as notions for actors, goals, softgoals, and interactions between actors (Yu and Mylopoulos 1998). Another example is GaML, which was specifically developed to model gamification (Herzig et al. 2019). Although GaML can be used by consultants and designers even without an extensive background in IT (Herzig et al. 2019), it cannot provide them with the ability to represent the organisational structure of the business and the intensive human factors of such systems in the model (Shahri et al. 2019).

DMML (Digital Motivation Modelling Language) is another modelling language that was proposed by (Shahri et al. 2019) for the modelling and analysis of digital motivation techniques such as gamification, with the aim of reflecting the social and organisation structure of a business via its models. The main idea of DMML is to consider the intense human factors in such systems as a main drive in the language. The DMML modelling language involves applying a digital motivation element (i.e. gamification) which is described in the language as (motives) to an organisational information system which (environment). In this thesis, the exploration phase of gamification risks discussed in **Chapter 4** also examines the social and organisational factors as a potential source of risk in the system.

As a result, this work will adopt the DMML modelling language as an initial step in order to give a clearer visual structure of the organisational model to which a motivational element is added. This will be the main step in the first stage of **GamRisk** in order to define the scope of the method. In this step, system analysts will use **DMML** to model the environment, including the actors, the tasks, the relation between them and the agents involved. It will also help them to model the motive (gamification element) being added to the environment. This will give a visual representation of the organisational structures and requirements in order to start the risk identification and mitigation process, which will be explained later in this chapter. **Figure 18** gives an example of notation used in DMML and **Figure 19** presents an example of a model using DMML.
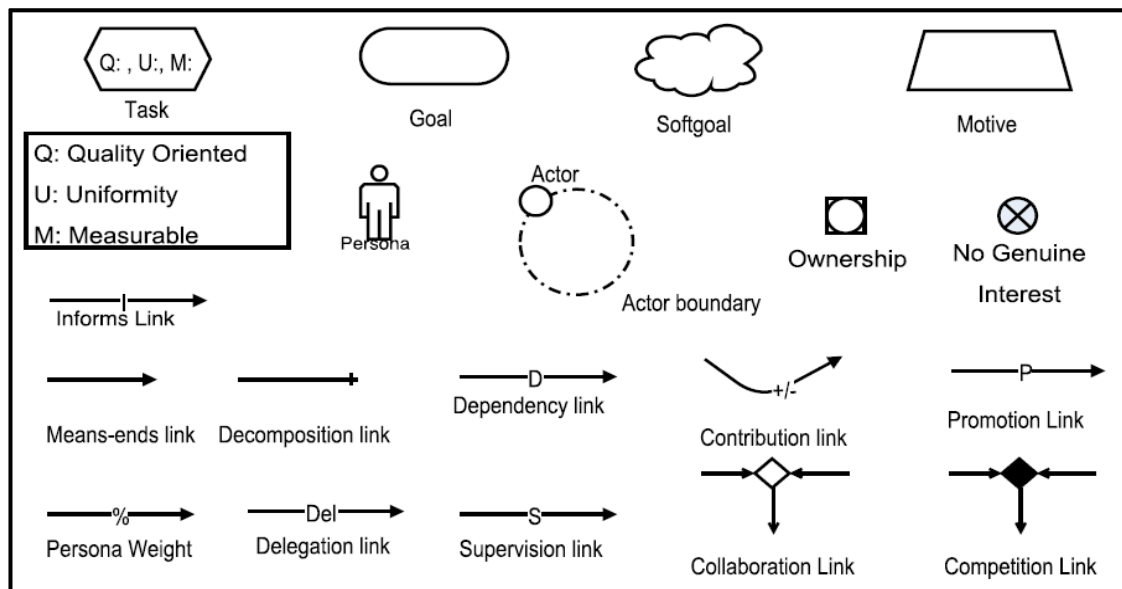
FIGURE 20: DMML NOTATIONS (SHAHRI ET AL. 2019)
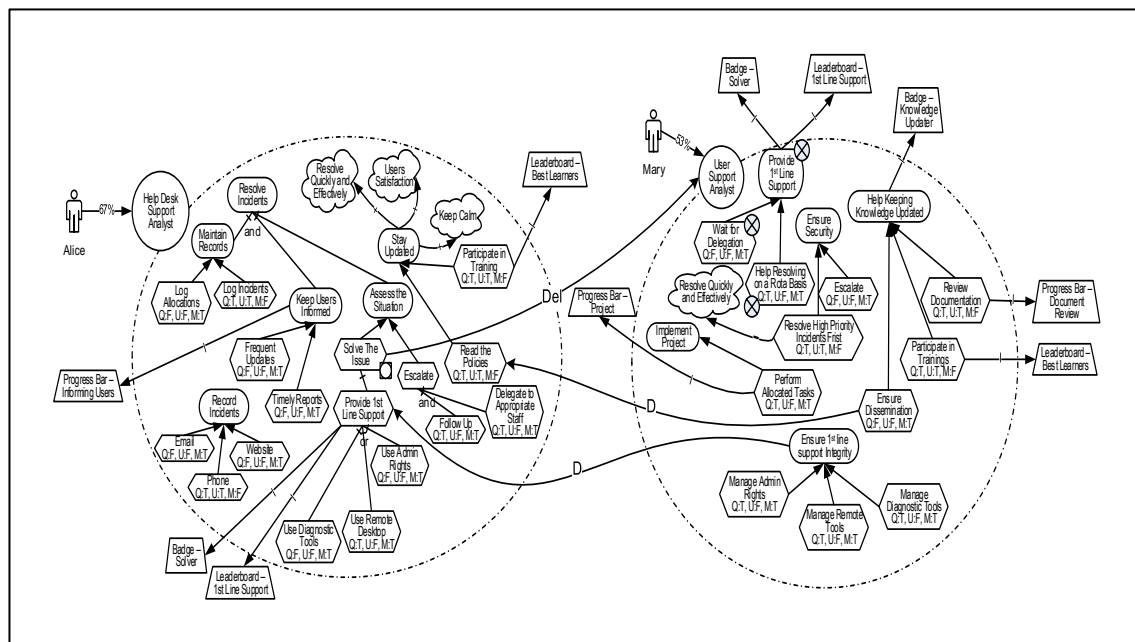
FIGURE 21: EXAMPLE OF A MODEL USING DMML (SHAHRI ET AL. 2019)

7.1.1.2   STEP 2: SCENARIO GENERATION

A scenario is a story representing actors or agents who have certain goals and objectives through a sequence of actions and events (Carroll 1995). The Oxford English Dictionary defines a scenario as "the outline or script of a film, with details of scenes or an imagined sequence of future events". Scenarios can be applied in reasoning about design and can also help as part of testing and evaluation methods (Monk 1993). Sutcliffe and Carroll (1998) identified several

purposes of scenarios in the design process, including the fact that they offer a useful approach to requirement elicitation. Rolland et al. (1998) describe the main purpose of scenarios as being associated with describing the real situation and the captured requirements. In this research, scenarios will be used as a representative tool to specify the different cases or situations that might exist when applying a gamification element in a business work environment.

In the second step of the **GamRisk** method, the analysis team needs to generate scenarios based on the organisational model created in the first step. In these scenarios, the analysis team should consider several guidelines and quality criteria, as shown in **Table 17**, in order to ensure the usefulness of the scenarios in identifying the scope of the risk identification process.

- **Scenario Generation: Guidelines and Quality Criteria**

This section will put forward a set of guidelines and quality criteria for an effective scenario generation process. The following criteria were compiled from the related literature (Sampaio et al. 2000, Gough et al. 2019, Sutcliffe 2019) to guide the scenario generation process. These criteria can be used by system analysts to ensure the usefulness and validity of the scenarios in representing actual situations in which gamification risks might exist in the environment.

TABLE 21: SCENARIOS GUIDELINES AND QUALITY CRITERIA

Guidelines and Quality Criteria
1#: Document the requirement specifications.
Creation of documents including different requirements existing in the system, for example, the project's scope, groups, environment, the agents in the groups, the stakeholders' needs and the service needs.
2#: Identify the main actors in the system.
This includes their goals, roles, responsibilities, aims and the tasks in which they are participating.
3#: Describe behaviour-related information.
This includes tasks, events, actions, activities and obstacles. Some user behaviours in the system cannot easily be captured through the models (developed in the first step of the method), and scenarios can therefore be used to support the descriptions of behaviours for both users and the system itself.

4#: Present a comprehensive set of relations.

This includes the relations between actors, roles and tasks. For example, a relation such as a dependency between goals, actors, and tasks should be clearly specified in the generated scenarios.

5#: Explain motives (rewards) and their related information.

The motivational elements used in the model of the organisation should be clearly identified in the scenarios. This includes the nature of the rewards used in the system, and value and reward strategies.

6#: Write scenario sentences as concisely as possible.

This will help to avoid confusing the readers, especially if these are normal users, and will help them to understand the situation and provide their related requirements. It is also preferable to avoid using words like 'may', 'must', 'can', 'should' etc.

7#: Describe the action or activity in the scenario clearly.

This helps to avoid any ambiguity and vagueness in describing the situation. Current actions in the system or predicted future actions should be clearly described, such as whether the goals can be achieved through the tasks or whether the dependencies between actors prevent them from carrying out the task.

8#: More scenarios give better coverage of potential gamification risk situations.

It is often difficult to decide when an adequate set of scenarios has been created. However, the checklist proposed in the next step of the method is a useful tool that can act as a guide in deciding whether the set of scenarios covers all potential risk situations and is therefore sufficient, or whether more scenarios are required. This checklist consists of a list of elements that the system analysis team, the managers and the end-users should examine to ensure that they cover all possible risk situations. This means that the checklist tool will be used in the next step in parallel with the scenario step for better risk elicitation and a more complete identification process.

9#: Apply supportive tools and techniques when needed for better scenario generation.

In some situations, scenarios cannot be easily generated, for several reasons. For example, the end-users may not be able to express their requirements or needs for the system. In these situations, techniques such as storyboarding and role-playing can help in speculating about situations and creating scenarios.

- **Storyboarding:** The main idea of this technique is to help practitioners (i.e. users and managers) to simulate situations in terms of graphical representations. This will help in

a walkthrough of different situations and in gathering feedback to support the creation of scenarios and the elicitation of their requirements.

- **Role-playing:** The main idea of role-playing revolves around imagining and performing (Diaz et al. 2009). Practitioners in the decision-making process, i.e. subject (staff) and management stakeholders, may be asked to play the specific roles that they would assume in the system. In this technique, the different roles within the system are defined and briefly described. This also requires a description of the tasks and goals that the role would involve. These roles can be then played by the appropriate practitioners, and a summary of requirements can be listed on a whiteboard. This can help in scenario generation.

- **Example of Scenario Generation**

John and Alice are working in a department of a call centre, in which a badge is given at the end of each day to the worker answering the highest number of customer calls. Since the motivation introduced here uses the quantity of calls answered as the information required to assess the performance of the employees, this discourages John from caring about the quality of his work in order to answer as many calls as he can to earn more points, which in turn will result in a reduction in the customer satisfaction level.

7.1.1.3   STEP 3: RISK IDENTIFICATION: *CHECKLIST*

This section utilises the results previously presented in **Chapters 4** and **6** to provide a tool which can help stakeholders in decision-making sessions to identify and resolve gamification risks. This study has demonstrated the need for such a tool, given the complexity of the risks and their interrelation with the nature of the task and the structures of the groups. In the literature, recommendations have been made for multiple sessions that are conducted iteratively, to allow for the comprehensive and continuous identification of gamification risks and the possibility of failure (Wallmüller 2002, Morschheuser et al. 2018). This section proposes a checklist tool which can facilitate the risk identification process and support stakeholders in identifying risks and expressing their concerns in relation to the gamification system.

A checklist can be used as a risk identification technique, and this approach has been widely applied in the literature to identify software-related risks (Boehm 1991, Wallmüller

2002). An analysis of the results gathered in this research indicates that gamification stakeholders, and especially staff who experience gamification, find it difficult to define the related risks. This is particularly the case in the early stages of the system design, where gamification has not been yet tried in a real workplace. Hence, the checklist tool presented in **Table 18** can help to inform and guide the risk identification process and thus help the stakeholders involved in the design sessions to identify, address and predict risks from the early stages of the system.

As mentioned by (Boehm 1991), a checklist can be developed as a risk identification tool based on identifying the main sources of risk through an iterative process with practitioners from related domains. The checklist in **Table 18** is proposed based on the results of extensive studies that have been conducted on the gamification risk factors described in **Chapter 4** and has undergone an iterative refinement process with the practitioners who were involved in the interviews and focus groups of this research.

The checklist is a risk identification tool which can be used during the decision-making session in the early stages of design of the gamification system. Managers, subject stakeholders and facilitators should go through the checklist to determine the initial set of risks and their main factors. Each answer of 'No' to a risk item in the checklist means that a particular risk has a high chance of occurring in the workplace. The risks are presented in the checklist by the symbol (R) followed by its number. These risks are listed in **Table 19**. The results can be then documented using a risk mitigation plan.

TABLE 22: RISK IDENTIFICATION CHECKLIST

Category	Risk Item	If 'No', consider 'potential' risks in Table 19
	a. Are all of the management and subject stakeholders or their representatives involved in the decision-making session?	All

Personal and social (1)	b. Within the same team and for the same gamified task, are the appropriate levels of [skills/capabilities/experience /training/age /understanding / time of involvement in a team] of the staff fairly decided and grouped?	R5, R6, R7,R10,R11,R 19,R20
	c. Are the interests of the subject (staff) practitioners within the same task or group without conflict?	R1,R2,R4,R12 ,R13,R15,R19
	d. Will those management and subject stakeholders who are involved in the decision-making session accept and commit to the plans and actions resulting from the session?	All
Technique (2)	a. For each gamified task, are the performance measurement style (automated or human-based) and scales well-defined and specified?	R3, R4, R5
	b. Have the support services (hardware or software) that are needed to achieve the goals of the gamified task been defined?	R8,R10
	c. Has the expected level of monitoring for the gamification element been well-defined and agreed?	R16,R17,R19
	d. For each gamification element, has the level of transparency and autonomy been well-defined and specified?	R7,R8, R16, R19, R20
	e. Within each gamification element, have the data storage and accessibility techniques been well-defined and specified?	R16,R17
	f. Has an automated feedback mechanism been well-specified?	R3,R4,R5
	g. Does the nature of the gamification element correspond to the nature of the work environment?	R4,R13,R14,R 15
Reward (3)	a. Are the reward and punishment mechanisms associated with the gamified task well-defined and specified?	R13,R14,R18, R19
	b. Does the nature of the reward/ ability to win defined and agreed?	R13,R14R15, R18
Task (4)	a. Are the task and the developed gamification mechanism appropriate in terms of their nature (e.g. a collaborative task with collaborative-based gamification dynamics)?	R14,R15,R19
	b. Have the task, measurement timing/measurement frequency/ nature/resources been well-defined and specified?	R3
	c. Within each gamified task, is the required level of [performance/cooperation/competition] between the involved team members well-described and understood?	R1,R2,R4,R6, R7,R9,R13,R1 4,R15,R19
Goal (5)	a. Are the goals of the management and the subject stakeholders for the outcome of the gamified task well-defined and without conflict?	R5,R7,R12,R1 3

The risks (R) summarised in **Table 18** are listed in **Table 19** below. These risks and their main sources in the gamification teamwork environment were discussed previously in **Section 5.5.**

TABLE 23: RISKS SYMBOLS

Risks Symbol	Risk
R1	Free-Riding
R2	Meet the minimum requirements
R3	Performance Misjudgments
R4	Clustering groups
R5	Lowering self-esteem
R6	Counterproductive comparison
R7	Negative pressure
R8	Bias
R9	Bribe for exchange
R10	Work Intimidation
R11	Novelty effect
R12	Deviation from goal
R13	Lack of engagement
R14	Reduce the quality
R15	Social loafing
R16	Infringe autonomy
R17	Kill of the joy
R18	Exploitation
R19	Lack of group coherence
R20	Negative reinforcement

7.1.2   RISK MITIGATION STAGE

The second stage of the **GamRisk** method is the risk mitigation process. This stage consists of two main steps: (i) management strategy; and (ii) modality of application.

7.1.2.1   STEP4: MANAGEMENT STRATEGY

In **Chapter 5** of this thesis, the focus was on exploring strategies that could help to manage the identified set of gamification risks explored in **Chapter 4**. This step of the **GamRisk** method involves mapping the gamification risk identified in Stage 1 to the most applicable management strategy. The management strategies are classified under three main categories, as shown in

Table 20. The application of this step in the **GamRisk** method will be explained in more detail in activity **4** in **Section 7**.2.

TABLE 24: GAMIFICATION MANAGEMENT STRATEGIES

Attribute	Management Strategies (MS)	(MS) Code
Setting up Agreements and Informing Participants	Commitment	MS 1
	Common ground rules	MS2
	Facilitator	MS3
	Voting	MS4
	Get everyone involved	MS5
	Norms	MS6
	Round robin	MS7
Checking and Reporting	Auditing	MS8
	Member checking	MS9
	Peer rating	MS10
	Random monitoring	MS11
	Self-assessment	MS12
	Storytelling	MS13
	External party	MS14
	Regular meeting	MS15
	Managerial level monitoring	MS16
	Transparency	MS17
	Anonymity	MS18
Appreciation and Control	Reward for helping others	MS19
	Acknowledgement of individual effort	MS20
	Non-contentious bargaining	MS21
	Rotation sensitivity	MS22

7.1.2.2   STEP 5: MODALITIES OF APPLICATION

In **Chapter 6** of this thesis, the various modalities of application of these management strategies were identified, involving people from various gamification backgrounds such as academic and business workplaces. This resulted in different modalities of application in relation to an understanding of: (i) *when* management strategies for gamification risks need to be applied; (ii) the main *purpose* of the strategy; and (iii) the *way* in which a strategy is to be applied, e.g. whether it is implemented directly or collectively. **Table 21** summarises the main modalities of application of the management strategies.

TABLE 25: MANAGEMENT STRATEGIES MODALITIES OF APPLICATIONS CHARACTERISTICS

	Feature	Characteristics	Examples (MS)
Purpose of Use	**Resolution**	- Attractive offers - Exchange of interests - Reward agreements	- Reward for helping others - Reward for individual contribution - Non-continuous bargaining
	Alleviation	- Self-recognition - Unexpected intervention actions	- Random monitoring - Anonymity
	Prevention	- Specific objectives - Timeframe - Informing - Policy tools	- Common ground rules - Commitments - Voting
	Positive encouragement	- Appreciation - Reward - Recognition	- Acknowledgement of individual contribution - Reward for helping others
	Reduced likelihood	- Regular modification - Random checking - Regular monitoring and updating	- Rotation sensitivity - Round robin - Random monitoring
Application Style	**Directive**	- Well-defined objectives and measures - Clear application directions	- Regular meeting - Voting - Random monitoring
	Complementary	- Collecting agreements - Setting up rules	- Round robin - Voting
	Moderated	- Complex strategy - Difficulty in steering the process - Difficulty in reaching consensus - External authority	- External party - Managerial level monitoring - Facilitator
	In parallel	- Links to other strategies - Reduced negative effect	- Self-assessment and random monitoring - Anonymity and peer-rating
	Iterative	- Repeatable - Changeable - Regular checking	- Rotation sensitivity - Random monitoring - Regular meeting
Application Time	**One stage**	- Setting up agreements - Informing - Structuring guidelines - Defining a style	- Auditing - Peer-rating - Commitment
	Two stages	- Facilitating other strategies - Controlling the application of other strategies	- Transparency - Facilitator
	Continuous	- Continuous benefits - Controlling and managing	- External authority - Facilitator
	Planned in one stage and executed in another	- Requires prior decisions - Requires agreement on application style	- Rotation sensitivity - Peer-rating - Random monitoring

7.2 RISK IDENTIFICATION AND MANAGEMENT METHOD (**GAMRISK**): ACTIVITIES

The **GamRisk** method uses a participatory approach to actively involve all of the related

stakeholders or their representatives in a decision-making session at an early stage of the design

process of the gamification system. This thesis has revealed the need for the decision-making session to identify and predict the gamification risks and to configure suitable risk management strategies for better implementation of the gamification system in a teamwork environment. The proposed **GamRisk** method encompasses the seven activities illustrated in **Figure 20** and follows the business process model and notation (**BPMN**). In this section, the stakeholders who should be involved in the decision-making session will be summarised, and we will then discuss the nine activities involved in **GamRisk** in more detail. The seven activities in **Figure 20** are intended to explain the two stages of **GamRisk** in richer detail.

The previous chapter explored the stakeholders that should be involved in the decision-making session. **Table 22** summarises the related stakeholders and their roles in the session, and specifies the activities each stakeholder should participate in.

TABLE 26: GAMRISK ACTIVITIES DESCRIPTIONS

Activity	Practitioners	Role includes	Documents **In:** Used in the activity **Out:** Produced as an outcome of the activity
(1)	- System analysts - Management	- Identifying the focus of the motivation system by modelling the organisational context, including actors, goals, tasks and motivation elements. This will be achieved with the involvement of management stakeholders. - Specifying personas to represent the end-users who will experience the gamification system.	**In: <u>D1</u>** (DMML language notations) **In: <u>D2</u>** (Persona to represent end-users)
(2)	- System analysts - Management - Subjects	- Generation of scenarios by system analysts to describe situations that might exist when using a motivation element in the work environment.	**In: <u>D3</u>** (Models created in **Activity 1**) **In: <u>D4</u>** (Guidelines and quality criteria to maximise the

	(staff)		usefulness of scenarios generation
(3)	- System analysts - Management - Subjects (staff) - Facilitator - Policy makers - Gamification developers - Business analysts - Behaviour change specialists	- Use of a checklist tool by system analysts, management and staff to identify and predict risk factors and examples of risks. - Application of a management strategy by the facilitator if necessary, such as voting, and entering the final result into **D5**.	**In:** **D5** (The **GamRisk** checklist tool to help to identify and predict risks (**R**). **Out:** **D6** (The identified risks (**R**) and their contributing factors)
(4)	Same as **(3)**	- Mapping the identified risks to the appropriate management strategies. - Checking each mapping decision with experts in the appropriate domain. - Storing by the facilitator of the final mapping results into **D6**.	**In:** **D6**: (Identified risks and risk factors) **Out:** **D7** (The final mapping of the management strategy (**MS**) and risks (**R**)).
(5) & (6)	Same as **(3)**	- Reviewing the results of **Activity 4** using document **(D7)** and identifying possible side-effects. - Discussing and deciding trade-	**In:** **D7** has two files: 1. The final mapping of management strategies (MS) and risks (R). 2. Trade-off options.

		offs of the identified side-effects.	**Out:** <u>**D8**</u> (The final mapping with potential side-effects)
		- Storing by the facilitator of the final results into **D8**.	
(7)	Same as **(3)**	- Defining the best modalities of application of management strategies for an effective risk mitigation process.	**In:** <u>**D8**</u> (The final mapping with potential side-effects)
		- Storing by the facilitator of the final results into **D8**.	**Out:** <u>**D9**</u> (Final result of the risk identification and mitigation process)
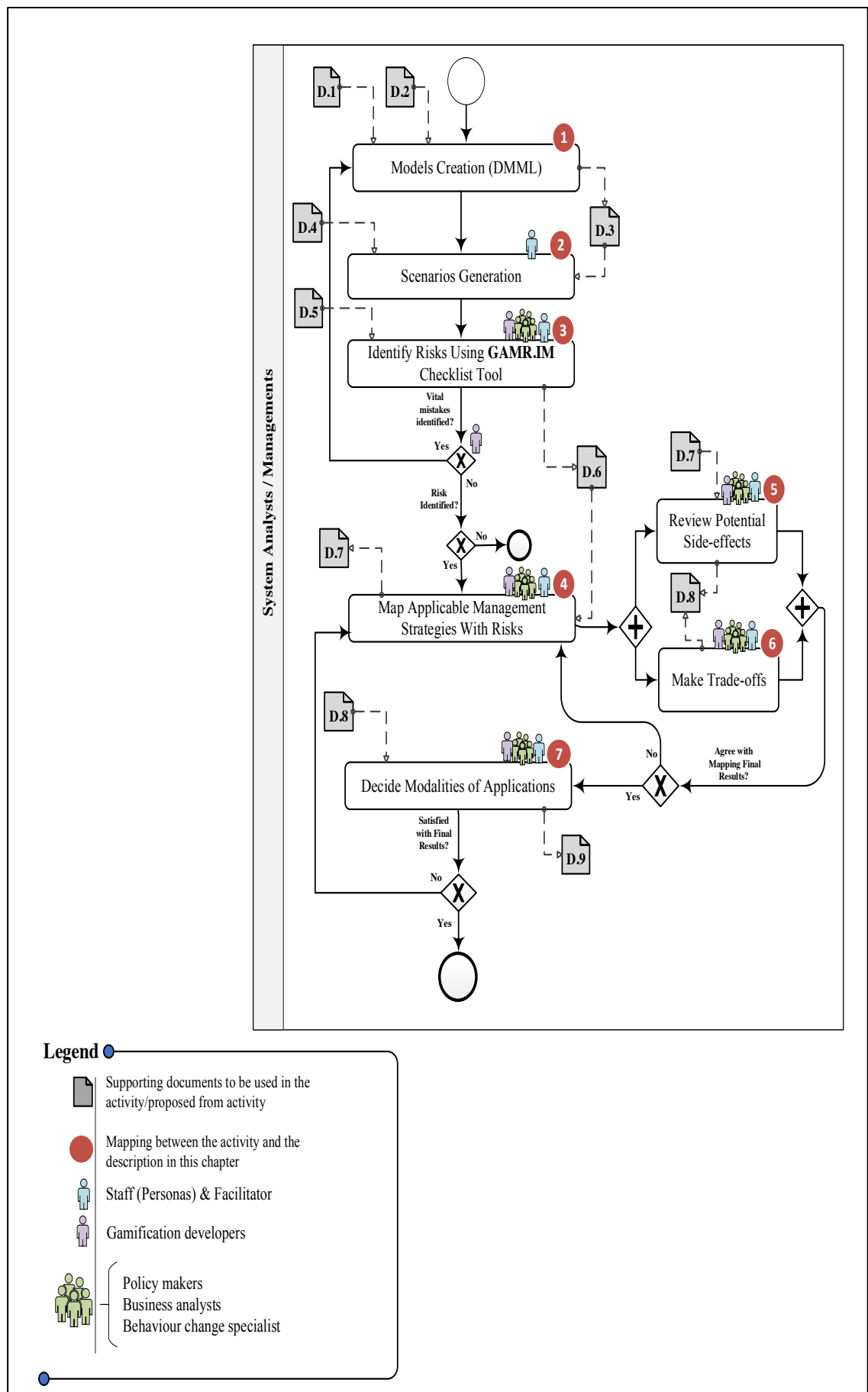
FIGURE 22: GAMRISK ACTIVITIES DIAGRAM

The diagram contains the following labeled elements:

Swimlane: System Analysts / Managements

Activities:
1. Models Creation (DMML)
2. Scenarios Generation
3. Identify Risks Using **GAMR.IM** Checklist Tool
4. Map Applicable Management Strategies With Risks
5. Review Potential Side-effects
6. Make Trade-offs
7. Decide Modalities of Applications

Documents: D.1, D.2, D.3, D.4, D.5, D.6, D.7, D.8, D.9

Decision gateways:
- Vital mistakes identified? Yes / No
- Risk Identified? Yes / No
- Agree with Mapping Final Results? Yes / No
- Satisfied with Final Results? Yes / No

Legend
- Supporting documents to be used in the activity/proposed from activity
- Mapping between the activity and the description in this chapter
- Staff (Personas) & Facilitator
- Gamification developers
- Policy makers / Business analysts / Behaviour change specialist

Activity (1):

The system analysts together with managements or project leaders work on describing the scope of the **GamRisk** method by providing a description of the environment including the goals, actors, motives, tasks and users requirements. In this activity system analysis and management can also use **D2,** where six personas of the motivational system's end-users are identified. These personas, as proposed by (Shahri et al. 2016), will help them to gain a better understanding of the users' requirements and preferences for the system. The system analysts are then responsible for modelling the final result, i.e. the organisation and the motives, using the supported document **D1** (**DMML** modelling language) (Shahri et al. 2019).

Activity 2:

The system analysis, management and subject stakeholders use document **D3**, which includes the models created in **Activity 1**. They will also use document **D4** to generate scenarios reflecting various situations in which the gamification element can be applied and might create conflict. The general guidelines and quality criteria described in document **D4** can help to specify what should be considered in these scenarios. As the validation study in the next chapter suggests, the checklist tool can be utilised to specify the number of scenarios needed.

Activity 3:

This activity is the core step in the risk identification stage of the **GamRisk** method. In this activity, system analysts, management, subjects (staff) and the facilitator participate in a decision-making session in order to identify and predict risks in the proposed gamification system from activities **1** and **2**. In this activity, **D5** will be used as a checklist tool to identify and predict potential risks. In **D5,** two main files will be examined: a list of questions to check all the expected risk factors in the system, and a link to an example of potential risk for each answer of '**No'** to the questions listed in **Table 18** .

The supporting document **D5** also has another file containing cards, where each card represents sub-categories of risk elements proposed in the checklist file (see **Figure21**). In these cards, three colours are used. Green means that the identified risk is at an acceptable level in the proposed system; yellow indicates risks requiring a mitigation strategy in the subsequent

activities; and red refers to risks requiring modification in the original system by returning to activity **1.** The facilitator stores the final results in **D6,** as shown in **Figure 22**, to be used in the subsequent activities. In this activity, following the validation process in the next chapter, it is recommended to involve all of the stakeholders defined in **Table 22** for the purposes of consultation and clarity.

Personal and Social				
1	Staff age in the same team	🟩	🟨	🟥
2	Level of skills in the same team	🟩	🟨	🟥
3	Level of capabilities in the same team	🟩	🟨	🟥
4	Level of experiences in the same team	🟩	🟨	🟥
5	Level of training in the same team	🟩	🟨	🟥
	1/1			

Personal and Social				
1	Level of Understanding in the same team	🟩	🟨	🟥
2	Involvement period in the same team	🟩	🟨	🟥
3		🟩	🟨	🟥
4		🟩	🟨	🟥
5		🟩	🟨	🟥
	1/2			

Goal				
1	Goals are define	🟩	🟨	🟥
2	Goals are not Conflicts	🟩	🟨	🟥
3	Goals Difficulty Level	🟩	🟨	🟥
4	Goals Way of Assignment	🟩	🟨	🟥
5	Goals Clarity	🟩	🟨	🟥
	3/1			

Technique				
1	Automated Measurement Mechanism	🟩	🟨	🟥
2	Level of Monitoring	🟩	🟨	🟥
3	Level of Transparency	🟩	🟨	🟥
4	Data Storage	🟩	🟨	🟥
5	Data Accessibility	🟩	🟨	🟥
	4/1			

FIGURE 23: CHECKLIST CARDS SAMPLES

FIGURE 24: IDENTIFIED RISKS AND THEIR RISK FACTORS (D.6)

Activity 4:

In this activity, all of the stakeholders presented in **Table 16** should participate in the decision-making session. This activity aims to create a mapping between the management strategies identified in yellow in activity **4** and stored in **D6**. For each risk, practitioners need to decide on the appropriate management strategies that can help to manage this risk. At the end of the activity, the facilitator stores the final mapping in a new document, as shown in **Figure 23**, calling it **D7**.

FIGURE 25: RISKS AND MANAGEMENT STRATEGIES (D7)

Activity 5:

This activity and the following one are designed specifically to review the results of the previous activity and to ensure that the final mapping has no possibility of causing side-effects.

Thus, this activity aims to ensure that the mapping has no further effects and to evaluate and decide between the different possible choices for activity **6.** This activity uses **D7**, the document in which the initial mapping between the management strategies and risks is stored.

Activity 6:

This activity should be implemented in parallel with the previous one, and the same practitioners should be involved. In this activity, the practitioners taking part in the decision-making session should review the different options and evaluate their suitability to manage the identified risks. They may also need to discuss possible trade-offs between the different options e.g. between risks or between risk and side-effects**.** The examination of trade-offs is an important step, especially when the management strategies cannot help incurring alternative risks.

In a similar way to activity **3**, the final results give three options. The green option contains an acceptable final mapping between the management strategies (**MS**) and the risks (**R**), with acceptance of the potential side-effects that might be introduced into the system. The yellow option contains a mapping which requires modalities of application for better mitigation of gamification risk in the following activity. The red option contains a mapping that is not acceptable because of the serious side-effects it might introduce into the system, thus requiring a return to activity **4** to find alternative possibilities.

The facilitator will store the final results of this activity and activity **5** in a new document, **D8,** as shown in **Figure 24.**
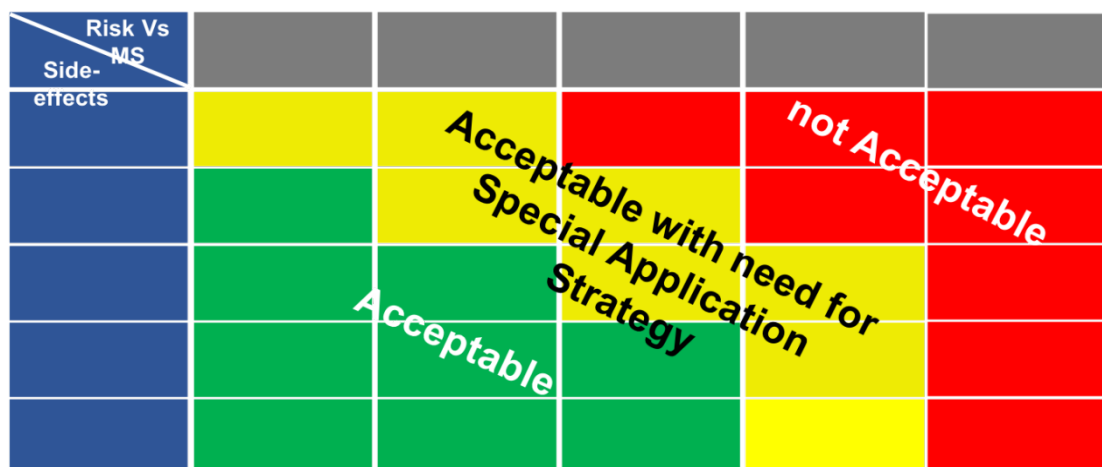
FIGURE 26: RISKS MANAGEMENT STRATEGIES AND SIDE EFFECTS

Activity 7:

The final activity in the **GamRisk** method mainly focuses on defining the possible modalities of application of the management strategy (**MS**) to mitigate the identified gamification risks (**R**). In the decision-making session, the practitioners who participated in activities **4**, **5** and **6** are also required to participate in this activity. The aim is to define modalities of application for management strategies. These modalities of application relate to (i) **when** to apply the management strategy; (ii) the **way** in which the management strategy should be applied; and (iii) the **purpose** of the application. In this activity, document **D8** resulting from activities **5** and **6** will be used to define which management strategies need specific modalities of application to mitigate potential risks or side-effects.

In addition, the participants will use document **D9**, as shown in **Table 21**, which contains elements that can support and facilitate the choice of the modalities of application for the management strategies (**MS**). The facilitator will store the final results in document **D10,** as shown in **Table 23.** At the end of this activity, practitioners can specify whether they are satisfied with the final results of the risk mitigation process; they may then end the process, or if there is a need for further enhancement, can return to **Activity 4**.

TABLE 27: MANAGEMENT STRATEGY MODALITIES OF APPLICATION (D9)

Risk	Management Strategy	Side-effects	Purpose of Use							Application Style						Application Time				Stakeholders			
			Identify		Mitigate																		
			Identify Limitation	Predict Risk	Resolution	Alleviation	Prevention	Positivity Encouragement	Reduce the Likelihood	Moderated	Directive	Individually	Complementary	In Parallel	Iterative	One Stage	Two Stages	Continuous	Planned in One and Executed in another	Management	Subject	Facilitator	Consultant

7.3   CHAPTER SUMMARY

The literature has a variety of risks assessment methods as it was mentioned earlier in **Chapter 2** and showed in **Table 3**. Each method has divided the process into different stages. Guiling and Xiaojuan (2011) and Avdoshin and Pesotskaya (2019) mentioned that the risks management stages discussed in the literature generally revolve around *risk identification*, *risk analysis, risk planning or mitigation, risk monitoring and control* stages. For example, Boehm (1991) classified the risk management process into *risk identification*, *analysis*, *prioritisation* and *control*. In addition, SoftRisk is another risks management method proposed by (Keshlaf and Hashim 2019) and focused on three stages risk *identification*, *assessment* and *control*. PRORISK (Suebkuna and Ramingwong 2011) and PRM (Linda 2011) are two risk management methods discussing the process from two stages the *risk assessment* and *risk control*. The ISO standard is an intranational standard for risk management which contains eleven risk management principles.

Although the ISO standard provides effective principles for risk management, the standard has a lack of detailed instructions on how to manage specific risk and limited advice related to the application domain. In addition, the standard remains as general guidance for effective risk management. In the proposed method of this thesis (**GamRisk**), the focus is more on the motivation attitudes of the gamification system and its unique effect for many reasons, e.g. the intense-human nature of such a system. Moreover, the proposed method provided step by step guidance for system analysts and management for an effective risk management process.

As a result, this chapter has proposed a risk assessment method **GamRisk** consists of two main stages (i) the risk identification stage involves three steps and (ii) The risk mitigation stage includes two steps. Although these two stages are the commonly discussed stages, they involved strategies and tools, i.e. checklist tool and management strategies which are not limited and can be used as a risk assessment and monitoring tools.

8.   CHAPTER 8: **GAMRISK** METHOD: EVALUATION

GamRisk is a method that provides assistance in identifying and mitigating gamification risks. A method is defined as *"an approach to perform a systems development project, based on a specific way of thinking, consisting of directions and rules, structured in a systematic way in development activities with corresponding development products"* (Brinkkemper 1996).

The aim of the **GamRisk** method is to increase the probability of successful implementation of a gamification system in a teamwork environment. Given the limitations of methods that help to provide risk assessments for gamification, the development of an effective risk assessment is a challenging aim. In **Chapter 7**, new risk identification and management method is proposed. The scope of this method involves guiding and facilitating the process and supporting its activities with documents, in order to enhance the clarity, usefulness, coherence, completeness and effectiveness of the process. This chapter aims to evaluate the **GamRisk** method for gamification risk identification and management based on a qualitative case study. This chapter is intended to accomplish **Objective 5** of this thesis.

The **GamRisk** method utilises a participatory design (PD) approach. As discussed in **Section 2.4.1**, the participatory approach has three main stages: exploration, discovery and prototyping. The *exploration* stage utilises a bottom-up approach. At this stage, a research study explores a real working environment and observes daily interactions with the gamification system in its real setting. The *discovery* stage is implemented via interviews and discussions with people in their workplaces in order to discover and understand their interaction styles and the potential effects of the system. Iterative *prototyping* is conducted to engage people from related workplaces and to evaluate the proposed set of management strategies and their application styles.

An evaluation study of an engineering method might differ based on the context of the evaluation itself, e.g. when people with different knowledge and experience are involved in the same study (Kitchenham 1996). The evaluation activity can be classified into three main types,

as described by (Kitchenham 1996).: *Objective, subjective* and *hybrid* evaluations. In an *objective* evaluation, the focus is on identifying the benefits of the proposed design by evaluating its effects quantitatively, such as a reduction in time or a change in cost figures. In the *subjective* approach, the evaluation process involves qualitatively assessing the appropriateness of the method in terms of meeting the organisation's requirements. Finally, the *hybrid* type is a mixture of objective and subjective assessments.

Another classification proposed by (Kitchenham 1996) focuses on the method utilised to evaluate an artefact. Three main methods have been proposed. In a *formal experiment*, the data can be collected statistically by involving participants in performing the task. A *case study* is the second approach, in which an artefact can be applied in a real context. The evaluation of a *case study* can be conducted based on the standards and procedures of a similar project. This thesis utilises a case study evaluation method, as discussed in **Section 8.1.7,** the last option is the *survey* method. In this approach, an evaluation can be done through collecting data statistically from other organisations or the contexts in which the project is applied.

8.1.1   AIM OF THE RESEARCH STUDY

This chapter aims to assess the ability of the **GamRisk** method to support risk identification and mitigation in the early stages of the gamification design process. The goal of the evaluation study is to evaluate the **GamRisk** method and its supporting documents in terms of its following aspects:

- **Usefulness**: The focus here is on measuring the extent to which practitioners can benefit from the method and its provided materials. In particularly, this involves assessing how the materials can support practitioners' choices and enhance their understanding of the process.

- **Clarity**: The evaluation study will help also to identify the level of clarity of the method and materials used to identify and mitigate gamification risk.

- **Coherence**: The method involves activities which use the outcome of the previous activity as supporting documents. The evaluation study can help to examine how far each activity can provide a solid foundation for the following one.

- **Completeness**: The evaluation study is also concerned with the level of completeness and self-explanation of the provided materials and their descriptions. Thus, attention is paid to ensuring the completeness of the supporting documents. This also includes evaluating the completeness of the proposed activities in terms of achieving the main goal of the **GamRisk** method, and evaluating the validity of the proposed procedures for stakeholder involvement in the activities of **GamRisk**.

- **Effectiveness**: Another point of focus of the evaluation study involves ensuring the effectiveness of the activities and the supporting documents in helping practitioners in the decision-making session to effectively identify and mitigate gamification risks.

In the validation sessions, the researcher will use observations and the practitioners' comments to measure the ability of the **GamRisk** method to meet these criteria.

8.1.2 THE EVALUATION STUDY: PROTOCOLS

A case study is conducted in this thesis in order to evaluate the proposed method in a real scenario involving practitioners with related backgrounds and experiences. A case study can be a useful technique for areas of research such as exploration, validation, data gathering and analysis of ethical issues (Perry et al. 2001). Lubbe (2003) specified the ways in which a case study can help as follows: "*as a research strategy the case study research method is a technique for answering who, why and how questions*".

This is particularly suited to the nature of the validation of this research. Thus, the aim of our case study was to assess the extent to which the **GamRisk** method can help to provide an engineering process to identify and mitigate gamification risks. In particular, the main focus of the case study evaluation was to determine how **GamRisk** could help participants in the decision-making session to identify the main factors of risks in the proposed case study. It could also help them to recognise risks with a high likelihood of occurring in the proposed

gamification environment. The practitioners taking part in the evaluation study used the proposed gamification management strategies together with other supporting documents to evaluate the mitigation process in real case settings. In this way, the case study approach enabled us to:

- Examine the ability of the **GamRisk** method to help practitioners from different backgrounds and roles to identify gamification risks in a real case.

- Investigate how the **GamRisk** method contributed to helping practitioners to achieve the outcomes of each activity when used collaboratively in a decision-making session.

- Gather data that helped to determine the strengths and weaknesses of the **GamRisk** method in terms of identifying and mitigating gamification risks in a real case.

8.1.3   THE EVALUATION STUDY: SESSIONS

The evaluation study involved three main sessions, as described in **Figure 25**. These are outlined in this section, and are explained in more detail in **Section 8.2**, which presents the results. The materials used in the sessions are present **Appendix 4.**
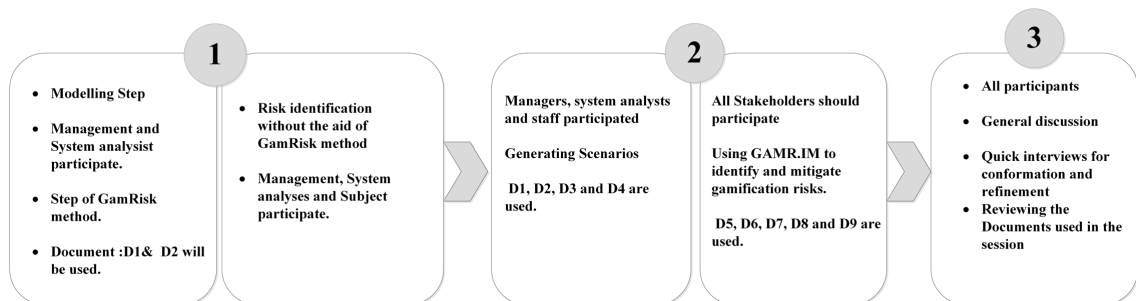
FIGURE 27: DETAILS OF EVALUATION SESSIONS

- **Session 1**

This session had two main purposes: (i) to design the first step of the **GamRisk** method (the modelling step); and (ii) to evaluate the risk identification process without the aid of the **GamRisk** method.

- **Session 2**

This was the main session in validating the **GamRisk** method. The session was divided into two stages, as follows:

- **Task 1**: Managers, system analysts and staff participated together in a scenario generation activity.

- **Task 2:** in this task, all of the suggested stakeholders listed in **Table 16** participated. The goal of this task was to identify gamification risks in the proposed design with the aid of the **GamRisk** method.

- **Session 3:** The main task of this session was to evaluate the **GamRisk** method, its activities and its materials, and to discuss its strengths and weaknesses.

8.1.4   EVALUATION STUDY QUESTIONS

The focus of the evaluation study was on determining whether the **GamRisk** method can answer the following questions. **Table 24** below presents the main questions, the answer sections and the stage of the method to fulfil.

TABLE 28: EVALUATION QUESTIONS MAPPING WITH THE CHAPTER SECTIONS AND GAMRISK METHOD STAGES

Evaluation Question	Answer Section	Stage of the Method
Q1: How can the method and its activities help to identify gamification risks in the proposed design?	**8.2.2.1** **8.2.2.2**	**Stages 2 & 3**
Q2: How can the method and its activities help practitioners in decisions on mitigating the identified gamification risks?	**8.2.2.3** **8.2.2.4**	**Stages 4 & 5**
Q3: To what extent can the supporting materials provided with the method assist practitioners in their decisions in each activity?	**8.2.2** **8.2.3**	**All stages**
Q4: What are the identified challenges, either in the method or in the supporting documents?	**8.2.2** **8.3**	**All stages**
Q5: What are practitioners' suggestions for improving the method and its supporting documents?	**8.2.3** **8.3**	**All stages**

8.1.5   EVALUATION STUDY: GENERAL PROCEDURES

The following general guidelines were used in the sessions of the evaluation study:

- The practitioners were provided with the documents with sufficient time before the evaluation day to allow them to familiarise themselves with the proposed case and the general activities of the sessions.

- The researcher gave an induction at the beginning of each session to explain the aims, objectives and activities of the session.

- The practitioners were gathered in one room and were given the related documents as shown in **Table 22**.

- The evaluation study consisted of three main sessions, as illustrated in **Figure** 25.

- To minimise the fatigue effect, the first session was implemented one week prior to the others. The researcher then analysed the results and prepared the materials for the following sessions.

- The researcher played the role of "a participant as observer" in the sessions in order to be able to take part in the discussion and provide guidance during the sessions.

- At the beginning of the session, practitioners were asked to read the proposed case and to discuss it in groups in order to ensure a level of familiarity before starting the activities.

- In order to reduce the time and effort required, practitioners were divided into two groups. They also used rating techniques when conflicts between choices arose.

- A facilitator was responsible for handling the session and managing the consultation part of the session when needed with the appropriate practitioners e.g. business analysts or behaviour change specialists.

- The researcher observed the practitioners during the session to assess weaknesses and strengths and to collect notes on the discussions between them.

- A follow-up open discussion was conducted in order to discuss feelings and ideas about the process within a group. This helped in collecting the participants' judgments on the **GamRisk** method and their opinions of the clarity and usefulness of the activities and the related documents.

8.1.6   EVALUATION STUDY: PRACTITIONERS SELECTION

The **GamRisk** method recommends the involvement of different practitioners in the decision-making sessions. The types of practitioners and their main roles in the session are shown in **Table 22**. Practitioners can be categorised into two main types. The first type represents the primary practitioners in the session, such as the system analysts, managers and representative staff who are going to experience the gamification system in the workplace, and a facilitator to guide the session. The second type represents the secondary practitioners, such as the policy makers, gamification developers, behaviour change specialist and business analysts. The main role of the secondary practitioners was to provide consultations with individuals from various related backgrounds about the decisions and choices the primary practitioners need to make in the session.

The selection of the primary practitioners was based on three conditions: (i) no less than five years' experience in their field; (ii) familiarity with gamification; and (iii) at least a good level (based on a Likert scale) of familiarity with the related topics shown in **Table 25**. The practitioners were selected using a convenience sampling technique by announcing the study and its requirements in students and staff research groups' mailing lists. The practitioners were involved in one or more sessions, as described later in Sections. There were eight practitioners in the session, as described in detail in **Table 25**.

TABLE 29: EVALUATION PARTICIPANTS DETAILS

Practitioner	Gender	Field of experience	Years of experience in this field	Group work experience	Session(s) participated in
P1	Male	Social informatics/ gamification (end-user role in the session)	6	5	First and Second
P2	Female	Gamification (end-user role in the session)	7	6	First and Second
P3	Female	Social informatics/ system analysis	5	8	First and Second

P4	Female	Computing/system analysis	10	5	First and Second
P5	Male	Behaviour change/ psychology	8	7	Second
P6	Male	Computing/ management/ business management	5	10	First and second
P7	Male	Behaviour change/ psychology	5	6	Second
P8	Male	Computing/ management/ business management	13	13	First and Second

8.1.7   EVALUATION: CASE STUDY

This section provides an illustrative example of how the **GamRisk** method can be used to identify and mitigate gamification risks. This example will be simplified by considering the roles and responsibilities of a research student and a supervisory team. Finally, to note that the description of the roles used here is summarised from a real university code of practice for research programmes.

Supervisory Team

The main duty of a supervisory team is to supervise students and to meet with them regularly to provide them with guidance and assistance. However, although the team may help by providing the students with useful resources, materials and advice when needed, the students are responsible for planning and managing their work and developing their ideas. Each student has more than one supervisor, whereas each supervisor in the supervisory team may have up to seven students. The supervisors in the team have the authority to delegate tasks to one another or to an external advisor when needed. For example, when the first supervisor is on leave, the second supervisor is responsible for attending scheduled meetings. They may also delegate tasks

to their students, such as giving laboratory-based lessons to undergraduate students or reviewing academic papers to help them to build certain academic skills.

To ensure that the student is doing well, the supervisory team are expected to set milestones for their students to monitor progress and to verify that the expected level of work is being achieved. Supervisors are also expected to read and comment on their students' work, and may organise a supervisory meeting to discuss these comments. The department has three research groups that organise seminars, workshops and training sessions, and both supervisors and PhD students are encouraged to participate effectively in the department's activities.

Postgraduate Researchers

PhD students are responsible for working toward achieving their degree in a timely manner. They are also responsible for maintaining the progress of their research in accordance with key milestones, for example, a transfer report, where students are assessed to ensure that their research project meets the required academic standards to continue at doctoral level. The student is asked to submit a transfer report no later than 14 months after enrolment as a full-time student. PhD students are expected to expand the existing knowledge in their research area by discovering and pursuing topics and research enquiries in the field. They are expected to ensure the highest integrity and ethical standards in their work, including data collection, analysis and the presentation of research data. Students are asked to maintain regular contact with their supervisory team and to agree on an appropriate schedule of meetings and objectives. They are encouraged to take responsibility for personal and professional development, including attending doctoral college activities such as inductions, workshops and conferences. They are expected to undertake appropriate skills training and career development.

- **Application of Gamification Techniques**

The department is planning to add gamification techniques to the environment in order to increase staff motivation towards various activities. This section will provide a description of the initial suggestions for arrangements for how these gamification elements will be

implemented. The main aim of this section is to act as a case study in order to evaluate the ability of the **GamRisk** method to identify and mitigate gamification risks.

The department has three research groups, each of which has up to eight students and at least four supervisors. Students are allocated into three different offices. The university department recognises the need to encourage research staff, including students and academics, to effectively participate in departmental activities such as training sessions, seminars and workshops, and to motivate them to become involved in external activities. This includes actively participating in postgraduate researchers' (PGR) conferences, where they can present their research contributions. As a result, the department decided to introduce gamification techniques.

The department decided to add an online leader board that was visible to all. Students in each office work collaboratively to effectively participate in the department's activities, including inviting others to participate, helping to organise activities, and providing valuable contributions to other departments. The department also decided to introduce badges, which were given to individuals for personal achievements outside the department, e.g. publications or presentations. The department advertised a scale explaining the criteria for each activity and how the credit would be given. At the end of each semester, the department would advertise the results on their main web page, and a research incentive in the form of a voucher for £500 would be awarded to the research group at top of the leader board. Moreover, the three students with the highest numbers of badges of all the groups would be named in their personal pages and the department's web page as winners for that semester, and the supervisory team for those students would be announced as the winning staff for the semester. Supervisors would be asked to encourage their students and support them toward achieving these rewards.

8.2 EVALUATION SESSIONS: SETTINGS AND RESULTS

This section will discuss the sessions that took place and the results of the evaluation study. The results were discussed in order to reflect on the evaluation questions and the criteria listed in **Sections 8.1.1** and **8.1.4**. The results will be discussed from two main perspectives: (i) the validity of the proposed method in terms of helping in the identification and mitigation of

gamification risk; and (ii) the validity of the supporting documents in effectively supporting this process. As discussed above, the validation involved three sessions:

- In the first session two main tasks were designed;

    - Models were developed for the proposed case in **Section 8.2.1.1**.

    - Gamification risks were identified in the proposed case without the aid of **GamRisk** (see **Section 8.2.1.2**).

- In the second session two main tasks were existed, **Section 8.2.2**.

    - Generate scenarios for the proposed models explained in **Section**

    - Gamification risks were identified in the proposed case with the use of **GamRisk** method. The task also included a mitigation process to evaluate the validity of the developed management strategies (**Section 8.2.2.3**).

- In the third session, the participants reflected on the results and an open discussion was held to review the proposed method and its materials (**Section 8.2.3**).

8.2.1 FIRST SESSION: THE RESULTS WITHOUT THE AID OF GAMRISK METHOD

Two main activities were involved in this session: (i) converting the proposed case into models using **DMML** modelling language; and (ii) evaluating the gamification design in the proposed case and identifying the potential risks which might arise in the workplace.

Participants

In this session, two system analysts and two managers' stakeholders participated in the first and second activities. In addition, two representatives of subject stakeholders (i.e. staff) were involved in the second activity in the session. The system analysts were familiar with modelling using goal models, and also had experience in modelling using **DMML**. The managers had a good level of computing experience, as explained in detail in **Section 8.1.6**. The managers participating in the activity were approached for their opinions and suggestions on the design procedures of the gamification system. They can also help to detect any issue either with the design of the system or the organisational setting.

Session Preparation

In order to ensure that practitioners had the required level of understanding of the materials and documents, including **D1,** which contained the **DMML** modelling language (Shahri et al. 2019) and **D2**, the persona document (Shahri et al. 2019), these were sent to the practitioners one week in advance. Practitioners were asked to prepare for the session and to contact the researcher for further explanation when needed. After all practitioners had notified the researcher and agreed to start the session, the session was carried out for four hours.

In order to minimise the learning influence, the researcher gave a tutorial at the beginning of the session about the **DMML** and several examples were discussed in groups, such as the call centre example mentioned in (Shahri et al. 2019). In addition, practitioners were expected to understand the modelling process. After ensuring a good level of understanding, the participants were given the proposed case, which involved the application of a gamification system in a university department, and the session's main activity was explained. They were then asked to start the modelling task. Due to time limitations and to minimise the effects of familiarity with **DMML** in this activity, practitioners were not asked to carry out the entire modelling from scratch but instead to provide sketches and descriptions of the models, which were then transferred to DMML by the researcher. The following subsections discuss the two activities involved in this session in more detail.

8.2.1.1   MODEL CREATION (*STEP 1* OF THE *GAMRISK* METHOD)

The aim of this activity was not to validate the ability of the **DMML** modelling language to model gamification requirements, since this was achieved in (Shahri et al. 2019). In this activity, the task involved modelling the proposed gamification case. Practitioners were given the case and the **DMML** modelling language, as stored in **D3**. The use of **DMML** was intended to provide representative models of the proposed case in order to assist the risks identification of the proposed gamification design. Managers were asked to help elicit a set of requirements for the case before starting the modelling activity. **Figure 26** and **Figure 27** are present the result after conducting this step.

In addition, participants were given personas as proposed in (Shahri et al. 2016) which could them elicit elements that differentiate people's needs and preferences from the system. These personas can be used to meet the users' preferences and needs on a large scale.

The researcher was involved as a facilitator in this activity in order to gain a better understanding of the usefulness and the difficulties of the process. During the activity, the participants interacted with each other and discussed the activity in groups beforehand, which allowed the facilitator to observe and document the process. Participants were able to model the proposed gamification design and also were able to define and model the gamification elements provided in the proposed case.

The managers found it useful to transfer the text into models as these allowed for a better understanding of the proposed case and greater clarity. They also found that the use of the persona document helped them to elicit the requirements of their users. The system analysts also found that the involvement of the management stakeholders helped them to understand the description of the case and to elicit the requirements for the system. The system analysts suggested involving representatives from the subject (staff) stakeholders, who could help to facilitate the requirement elicitation process and thus assist in the risk identification process.

In this activity, the researcher focused on the usefulness of the materials in modelling the requirements of the proposed case, and evaluating the usefulness of the models in terms of the understanding of the managers. The overall finding of this activity was that the models helped to increase the level of understanding and made the case clearer before starting the risk identification process. However, there was some debate regarding the attributes of the task e.g. the measurability and subjectivity. In such cases, agreements were formed by the facilitator using a voting technique.

The participants described documents **D1** and **D2** provided for the activity as being self-explanatory. However, the facilitator was on hand to help eliminate any ambiguity when necessary. The duration of the activity was one hour and 30 minutes. At the end of the activity, the final artefact was reviewed and agreed on by all of the participants. A break for 15 minutes was then allowed for refreshments and the next activity was started.

FIGURE 28: DMML MODEL OF THE PROPOSED CASE

FIGURE 29: DMML FOR ACTORS' RELATION ON A TASK

8.2.1.2   RISK IDENTIFICATION AND MITIGATION WITHOUT THE AID OF *GAMRISK* METHOD

The second activity in this session involved the same system analysts and managers. As suggested in the method, two representatives from the subject stakeholders (i.e. staff) also participated in this activity. They were familiar with gamification, and had experience of this type of system in a workplace. Moreover, the practitioners were aware of the risks such a system might cause in a workplace, based on their backgrounds and experience and from the document that was provided to them that explained **DMML** and its applications in detecting certain sorts of risk. This activity was performed to identify gamification risks without the aid of the **GamRisk** method.

The researcher started the activity by explaining the proposed case. The system analysts and managers were familiar with the models, as they had built them in the first activity. The role of the subject participants involved helping in eliciting their requirements and preferences for the system and agreeing on the final results at the end of the session. The participants were divided into two groups in order to increase the chance of eliciting a variety of views. This also helped to decrease the influence of each other's points. The findings of each group are represented in **Tables 26** and **27**.

TABLE 30: FIRST GROUP RESULT OF THE FIRST SESSION

Identified risk	Risk factor (s)	Description
Pressure	Peer comparison Transparency	Being transparent to all members of the department
Comparison	Achievement	Comparing achievements with others who may be more qualified
Social loafing	Collaborative work on a task	Working together may mean that one person is doing the work for others
Negative competition	Rewards	Advertising a reward to the whole department may have a negative effect
Confusion between tasks	Tasks and rewards	Multiple tasks and rewards might cause confusion for people without guidance, which will lead to a lower motivation to participate

Identified risk	Risk factor	Description
Lower self-esteem	Visibility	The visibility of the results of the leader board
Neglect of a collective task	Individual badges	Staff may focus only on the badges
Unfair judgments	Collective task	There is no clarity on the system of measurement
Low motivation	Interest in the reward	The reward might be not of interest to staff
Stress	Leader board	The use of the leader board may increase stress
Less engagement	Reward	Some staff may be not interested in the reward, and this may make them less motivated

An analysis of the results highlighted some issues in relation to the risk identified in this activity, as follows:

- It seemed from the results that some participants had **misunderstood the difference between the risks themselves and the risk factors**. This may lead to negative consideration of the risk, which might negatively affect the validity of the system design. For example, in the discussion in the session, a participant pointed out that "*the advertising of the names is a risk and users might have different preferences in relation to that*". In fact, the advertising of participants name may become a source of risk, rather than a risk in itself.

- It was noticeable that participants had a **lack of understanding of the sources of risk and the main characteristics of the system** for motivating users. For example, as described in **Table 26**, one group identified *pressure* as a risk, whereas some elements employed to motivate users aimed to introduce some positive pressure on them e.g. via the monitoring element.

- The long **time** spent in taking decisions was clearly marked during the validation session. Participants were not able to easily decide on or detect risk situations. This was also evident when the facilitator asked them to finish the task while one group was still examining the case description.

- An analysis of the findings from both groups showed that the identified risks were mainly associated with the motivation element (e.g. the reward), the visibility of the results and judgments, without looking at **the underlying risk factors** such as the social structure of the environment and the characteristics and goals of the people and groups involved.

8.2.2 SECOND SESSION: THE RESULTS OF RISK IDENTIFICATION AND MITIGATION PROCESS WITH THE AID OF **GAMRISK** METHOD

The second session was designed to evaluate the use of the **GamRisk** method to identify and mitigate gamification risks in the proposed design. In order to minimise the fatigue effect, the session was implemented on a different day. In this session, one main task was involved, which was risk identification and mitigation with the help of the **GamRisk** method.

- **Participants**

In this session, all of the practitioners listed in **Table 16** were involved, with different levels of involvement in the activities, as suggested in the method. For the first and second activities, the participants were the system analysts, management and subject stakeholders, while in the subsequent activities, all of the other stakeholders were involved. The participants were divided into two groups, each with four participants. Each group had a mixture of backgrounds and experience, e.g. system analysis, management, gamification, psychology and business management.

- **Preparation**

Eight participants were involved in this session, as shown in **Table 25**. All of the documents were sent to the participants two weeks prior to the session. Participants were asked to contact the researcher for further explanation if necessary. Before starting the session, the researcher gave a presentation explaining the purpose of the session and its main activities. The researcher played the role of a "participant as observer". The participants were provided with a full set of the documents needed, and each of these were explained to all the participants. A clear workflow diagram was shown to them, in which the participants and documents for each activity were clearly specified.

Before starting the main task, the system analysts, managers and staff were asked to generate scenarios extracted from the models representing specific situations where the gamification system was applied to a work environment following certain quality criteria. The scenarios were specifically meant to help practitioners to focus on special cases from the organisational model and to start the identification and mitigation process. Following this, all of the participants were involved in the risk identification and mitigation process. This task fulfilled the second step of the proposed **GamRisk** method. The session lasted for five hours, of which one and a half hours were used for scenario generation and three and a half hours for the risk identification and mitigation activity. The following subsections are organised based on the steps of the **GamRisk** method in order to explain the results of the validation.

8.2.2.1 *SCENARIO GENERATION STEP*

The first activity in this session involved generating scenarios from the models proposed in the first session in order to fulfil the second step of the **GamRisk** method. In this activity, the method suggests the participation of system analysts, management and subject stakeholders. The system analysts and managers were familiar with the models, as these had been created by them in the first session. The duration of the activity was one and a half hours.

The scenario generation step was intended to facilitate the risk identification process. This can be achieved by focusing the scope of the process onto specific cases using the guidelines provided in document **D4** in **Table 18.** The scenarios, which are written in simple, plain language to describe a single event or transaction, can help to facilitate the risk identification process.

The scenario generation activity started with reading the case and then working collaboratively to identify the elements suggested in the supporting document **D4**, such as documenting the scope of the project and the stakeholders needed, and identifying actors, events and obstacles to scenario generation. Participants were able to specify the set of elements and to start the scenario generation task. To save time, the researcher worked with a system analyst individually before the session to create a set of scenarios, and showed these to the participants in the session so that they could benefit from them and create similar scenarios for other cases.

An analysis of the results of this task clearly demonstrates the following points. These are followed by a sample of the scenarios generated in the session.

- The scenarios assisted in narrowing the discussion to specific cases. The subject (staff) participants reported that they found the scenario step a very useful way of helping them in the requirement elicitation process and of focusing the discussion onto certain situations: "*I liked the focus in the scenarios, this helped me to gain a deeper understanding and to break down the overall case into smaller ones*". This was especially for participants with less ability to understand the models.

- Although scenarios helped participants to engage more in the session and facilitated the requirement elicitation process, one participant suggested that they should be carefully used. This is because an absence of clarity in any of the requirements or goals may lead the participants to make assumptions that give rise to an additional set of requirements for the design description.

- A different view was that this was a time-consuming step. One system analyst argued that although it seems to be a useful tool to stimulate discussion and form a narrative for the case, it is expensive in terms of time. This participant commented that the risks can be detected by using the checklist with the model itself.

- The role-playing and storyboarding techniques, as suggested in the supporting document (**D4),** seemed to be useful in facilitating the activity. One manager emphasised their usefulness in stimulating the requirement elicitation process. However, it was noted that this required careful implementation, as it might lead to additional requirements for the proposed design. Participants also suggested that there was a need for a full description of a way to apply these techniques, including how the roles should be described and assigned to participants.

Samples of the scenarios generated in this step

The following are examples of three scenarios generated during the validation study session in order to focus on specific situations of the reward system.

First Scenario

John is an academic member of the computing department at University X. One of John's responsibilities is to supervise Alice, Bob and Thomas in their PhD research. In addition to their research, Alice, Bob and Thomas participate in the departmental research groups. The allocation of these groups' members depends on their choices and availability. Although Bob and Alice are in the same research group, they do not share the same background and research interests. Before starting his PhD study, Bob was employed in a workplace that applied gamification techniques to motivate their staff. Despite being interested only in his PhD research, Thomas has been added to one of the research groups in the department. At the end of the semester, the department advertises the results on their web page. Thomas' research group was the winner of the leader-board award, and Bob was one of the winners of the badges. As a result, John sends a collective email to all of his students and also shares it with all of the departmental research groups to congratulate his winning students for their achievements.

Second Scenario

Alice and Thomas share some similarities in the main focus and background of their research, and help each other to overcome certain research difficulties or by sharing useful materials. Alice is 27 years old and Thomas is 43 . Thomas is not interested in group research activities, while Alice is ambitious to demonstrate her abilities and to try to win the individual and group awards. John, their supervisor, asks both of them to work collectively on a small project related to their research topic and to submit a final report to him on the results by the end of the semester.

Third Scenario

Alice and Tim are PhD students supervised by Richard. Alice is in her final year, and was a winner of the badge award three times during her PhD. The award system used in the department has started its seventh cycle, with the same reward and the same strategy. Their supervisor Richard encourages them to participate in the award systems. Although Tim only started his PhD at the beginning of the new cycle of the award system, he was the winner of the

latest badge award. Alice no longer has the same interest in participating in the award system, and this makes her worried about her reputation in the department and in her supervisor's eyes.

8.2.2.2   *RESULTS OF RISK IDENTIFICATION STEP (**CHEICKLIST**)*

The second activity in this session involves risk identification using the checklist tool. In this activity, the participants were the same as in the previous activity (system analysts, management and subjects) with the involvement of a facilitator as a stakeholder. This activity is essential to the risk identification process. The process started with a re-reading of the case with the scenarios generated in previous activity. Participants were told to use document **D5** for the activity, which includes two main files: (i) the risk identification checklist tables (**Table 18**); and (ii) the checklist set of cards (**Figure** 21).

The researcher, who was playing the role of "participant as observer", asked both groups to assign a facilitator role to one participant in each group. The facilitator was responsible for steering the discussion, managing the voting technique when necessary to reach agreement, and storing the final results of the activity in document **D6**. As mentioned above, the aim of the validation study involves validating the activities of the **GamRisk** method to identify gamification risks and the supporting documents used, rather than solving the issues in the proposed case. Thus, the observer was primarily examining how the participants identified the risks, rather than which risks they identified. The following bullet points present an outline of the results of an analysis of this activity. The gamification risks identified in each group are shown in **Table 28**.

- The checklist tool supports the clarity and effectiveness of the process. The participants agreed that the checklist provided in document **D5** was helpful in allowing them to be more focused while reading the case and to look specifically for factors that might cause risks, rather than a more general approach that would waste time.

- The participatory approach used in this method supports the effectiveness of the requirement elicitation process. One system analyst emphasised that the participatory approach provided a way of directly communicating with the subject (staff)

stakeholders to elicit their requirements and allow them to actively engage in the session, which eases the risk identification process and saves time and effort.

- Both groups emphasised the usefulness of the facilitator being involved in the activity. One participant commented: *"The facilitator helped us to save time and effort by asking the questions in the checklist and we (the other participants) focused on the case to provide him/her with the answer"*. Another participant suggested that the facilitator might also help in "*turning the discussion to the correct participant (based on the background) when participants struggled to link the risk factor with the risk*".

- The observer noted that participants spent a relatively long time on deciding whether or not the risks suggested in the checklist might exist in the proposed design. As a result, the observer asked the participants whether the involvement of other stakeholders (those suggested for the next activity) would help them to decide when they were struggling. For example, in the proposed case, it was mentioned that "*the department decided to add an online leader board visible to all* ", and one of the elements in the checklist tool (question 'g' in the technique category) required participants to check whether the gamification element was suitable for the environment. However, the participants did not know whether the use of a leader board was appropriate for the departmental environment. Participants strongly agreed that the involvement of gamification developers in this case would have helped them to decide by giving information on the nature of the leader board gamification element. As a result, the method was amended to involve the same participants in **Activities 3** and **4**.

- The checklist does not indicate the level of severity of the risk. One participant suggested that "*the checklist might also be extended to cover the level of severity the risk might cause to the proposed gamification design*". This might help when the participants need to label the identified risks with a colour (green, yellow or red), as explained in **Section 7.2**. Further reflection on this point is presented in **Section 9.3**.

- The cards used to divide the checklist into subcategories seemed to be a debatable aspect. It was noticed that participants had different views regarding the use of the set of

cards provided with the checklist document. They suggested either using the checklist tool or the cards, with the involvement of the link between the factor and the potential risks as they used in the checklist tool. The results suggested that both materials might be kept, and the participants given the ability to select either of them.

- Some points were helpful in increasing the completeness of the checklist tool. A manager participant suggested that the checklist tool had elements which were relevant to the goal factors, and that these should be categorised under social and personal factors. This was confirmed and amended in the final version.

- It was noted that participants had conflicting ideas about adding a list of risks to the checklist tool in **D5**. Some of them felt that this might influence their choice of risks, while others believed that this could help them to examine those specific risks in the real situation. This suggested the need to add the word "**Potential**" to the checklist table to clarify that the risks specified here are only possible options, and are not limited to these choices.

- A point was made regarding clarification of the scenario generation step. A system analyst participant (who was involved in the scenario generation activity) stressed that the checklist tool should be combined with the scenario generation process in order to provide clear guidance on which elements need to be covered in the scenarios. This would also help to specify the number of scenarios needed. As a result, the scenario generation quality criteria document (**D4)** was amended accordingly.

- It seems from the results that both groups identified a similar number of risks with a yellow label, i.e. those that required mitigation processes as described in **Table 28**, while they showed slight differences in the number of red risks identified. This was due to the focus of the method and the fact that the guidelines were mainly related to the yellow type of risk, which requires mitigation strategies.

At the end of this activity, the participants were asked to evaluate the risk identification process with the use of the **GamRisk** method. The following bullet points summarise the discussion:

- **Perceived usefulness**: All participants agreed on the usefulness of the checklist tool in enriching their thinking about the potential risk factors. It also helped to ensure that participants were not overlooking certain risks in the proposed gamification design.

- **Clarity and comprehensiveness:** The checklist tool helped to reduce the ambiguity in the description of the risks in the proposed case. It was also helpful in the comprehensive identification of risks in the current design and the prediction of risks that might exist in the environment, using a structured and consistent inspection approach.

- **Useful communication:** The participants agreed that the use of the checklist tool alleviated difficulties in communication between system analysts and subject users (staff) or managers in regard to their understanding of the requirements of the proposed case.

- **Cause and effect:** The checklist tool was a meaningful tool for providing links between effects (risks) and their commonly related causes (factors).

- **Ease of use:** The engagement of the practitioners with the activity, and especially those with "fresh" eyes (who were not involved in previous activities), provides clear evidence on the simplicity of understanding and use of the checklist tool.

TABLE 32: OUTLINE RESULT OF THE RISK IDENTIFICATION ACTIVITY

Group	Risk Identified	Risk Factor	Severity Level (Green, Yellow, Red)
First Group	**14 Risks**	**7 Risk Factors**	**11 Yellow Risks** **3 Red Risks**
Second Group	**12 Risks**	**7 Risk Factors**	**11 Yellow Risks** **1 Red Risk**

8.2.2.3   *RESULTS OF MAPPING MANAGEMENT STRATEGIES WITH RISKS*

In this activity, the **GamRisk** method suggested the participation of all stakeholders shown in **Table 16**, or their representatives. The main aim of this activity was to map the gamification risks to the most appropriate management strategies. The validation of this activity also involved the validation of activities **5** and **6** in the diagram. The mapping process was performed over three iterations: the first mapped the management strategy to the risk; the second checked the possibility of side-effects occurring; and the last iteration reviewed the final set of mappings and the trade-offs between different possibilities. The time allowed for this activity was one hour. Participants were asked to use the output of the previous activity, which was stored in document **D6**. This document had three files: (i) risks identified in the previous activity; (ii) a set of management strategies to help in gamification risk mitigation; and (iii) descriptions of the management strategies and the general characteristics of the risks they might help to manage. The participants were advised to use the cards provided with the document, where each card represented a management strategy, and to link them to the relevant risks. This helped to ease the task and increased engagement. The facilitator then stored the final set of mappings between management strategies and risks in document **D7 (see sample in Appendix 4 Part 12).** In the second iteration, participants reviewed the final mapping in **D7** and stored the final review of side-effects and trade-offs in **D8**.

In this activity, participants were advised to decide on the mapping between risks and management strategies using two strategies: (i) based on the supporting documents; and (ii) based on the participation of people from a variety of related backgrounds e.g. psychology, gamification and business. The facilitator played a vital role in guiding the discussion and aiding in the decisions made in the final mapping. Voting and ranking techniques were used when differing views arose. In order to encourage a rich dialogue, participants were provided with the following questions to guide the discussion:

- In the first iteration: What are the applicable management strategies for managing the identified risk?

- In the second iteration: What are the possible side-effects of the mapping decisions made in the first iteration?

- In the third iteration: What are the trade-off decisions between the identified risks and the side-effects?

At the end of the session, the facilitators stored the final sets of results, including the mapping between risk and management strategies, the potential side-effects and the trade-off decisions, in document **D8** in order to be used in the final activity. The following bullet points present an overall analysis of the results in this activity:

- The process provided useful guidance in itself. It was noted that mapping decisions were made without the need to return to the case. By identifying the risks and risk factors in the previous activities, participants were able to revise the proposed design and take decisions to manage the potential risks. This means that the method was clearly guiding the participants through the process.

- The focus was not only on the effectiveness of the mapping decisions but also on the validity of the solutions in relation to different elements such as the time, e.g. whether a strategy was a long-term treatment or whether it could only help for short period of time. For example, when one group specified a *rotational sensitivity* management strategy to manage novelty effects or clustering group risks, a manager participant suggested that "*this is going to help only for short period of time*". This indicates the need to specify the application style (the next activity) for enhanced risk mitigation decisions.

- An analysis of the observation notes shows that the gamification developers were concerned about the effect of the mapping decisions on the nature or characteristics of the system itself. In other words, they were concerned to ensure that the added management strategy would not affect elements like real-time measuring, traceability and comparison in the system. For example, one end-user participant (staff) suggested that the implementation of a strategy such as *transparency* would exert pressure on them, and needed to be planned in order to eliminate this side-effect. However the gamification developers commented that "*One of the aims of the system to make it effective is to add some positive pressure on users*".

- Classifying the management strategies seemed to support the usefulness of the material. A system analyst suggested that the classification or categorisation of the management strategies should be based on their nature or related effects, rather than mapping them to risks on a one-to-one basis. The researcher confirmed that both approaches were possible, and the management strategies were already categorised under three main categories as shown in **Table 20**.

- It was observed that when they were struggling with applying a *peer rating* to manage peer engagement issues in a task, one group asked the facilitator to refer the discussion to the participants with psychology backgrounds, to ask them "*whether the application of peer rating would have a negative effect between peers*". This demonstrates the usefulness of the approach followed in this session and the need for participation by stakeholders from related fields.

- Balance between usefulness and side-effects, It was also noted that participants discussed the importance of the careful application of a *transparency* strategy, with a balance between its features and the side-effects on the environment. For example, in the proposed case it was mentioned that "*the leader board will be visible to all*", and one participant suggested a balanced implementation of this feature in order to avoid destroying the environment and eliminating the feature of healthy competition from the system. As a consequence, a manager suggested making the feature transparent only within each group, and at the end of the competition the final results could be shared between the groups in the department.

- In the second iteration of this activity, which focused on reviewing the results of the first iteration and identifying possible side-effects, a participant stressed that the side-effects might be also take the form of risks from the same risk lists. This confirmed the finding in **Chapter 5** that discussed the possibility of some mapping strategies causing a domino side-effect. For example, one participant suggested that adding a *transparency* strategy to staff performance in the leader board as a management strategy could help to reduce the chance of risks in relation to misconception,

conspiracy and unfairness e.g. an <u>anchoring bias</u> in the department. However, this strategy might encourage further risks to occur such as <u>infringing autonomy</u>, which might have a negative effect on staff engagement in the task.

- In the second iteration, after reviewing the mapping decisions made in the first iteration, there a number of amendments were made as shown in **Table 29**. For example, the first group was identified the conflict of interest a source of risk as it was mentioned in the scenarios *"Thomas is not interested in group research activities, while Alice is ambitious to demonstrate her abilities and to try to win the individual and group awards. John, their supervisor, asks both of them to work collectively on a small project"*. As a result, they identified that risks such as <u>lack of engagement</u> can arise in this situation. The management strategy decision was to add a peer rating technique to prevent this risk. However, after reviewing the side-effects in the second iteration the participants decided that *peer rating* might encourage risks such as a <u>bribe for exchange</u>. Thus, they decided to replace the peer rating strategy with managerial level monitoring.

- Similarly, in the third iteration, an analysis of the results identified that the groups had made some amendments to their results, as shown in **Table 29**. These amendments were made because a management strategy was costly in terms of budget, effort or time. For example, one group replaced *external authority* with *random monitoring* after this was suggested by a business management participant, who commented *"They both have similar benefits while the internal random monitoring is lower in cost"*.

TABLE 33: OUTLINE RESULT OF THE MANAGEMENT STRATEGY MAPPING

Group	Number of mapping decisions	Number side-effects identified	Number of Trade-offs decisions
First group	21	5	2
Second group	18	6	2

This was the final activity in the session. The aim of this activity was to define a set of applications of the management strategies stored in **D8** as a result of the previous activity. Each application was defined in terms of its (i) application style; (ii) application purpose; (iii) application time; and (iv) the application responsible stakeholders. The duration of the activity was one hour.

The participants were familiar with the identified risks and the management strategies assigned to them. In this activity, they were asked to use document **D8**, which contained the final decisions resulting from the previous activities. They were also provided with another file, as shown in **Table 21**, which contained a set of considerations that could be used to facilitate their choices. The task in this activity involved ticking boxes, as shown in **Table 23**. The main focus of the observer was on identifying how the participants were making their choices and the sort of questions being asked. The final results were stored in document **D9,** which included (i) the identified risks; (ii) the applicable management strategies; (iii) the potential side-effects; and (iv) the choices of the modalities of application. The following bullet points summarise the main results of the analysis:

- It was clearly observed during the activity that participants had become familiar with the documents and had understood the process. This indicates the level of clarity regarding the flow of the process and the supporting documents.

- It seems that the decisions made in relation to the modalities of application were mixed, with one choice for some management strategies and more than one choice for others.

- This activity clearly showed the usefulness of the participatory approach in supporting the decisions on the methods of mitigation. In this activity, it was clear that participants were primarily discussing rather than reading, since the supporting document in this activity was designed to encourage discussion and ticking boxes rather than reading documents and writing down choices. In other words, the participation of people from a variety of related backgrounds helped in specifying the choices of application of management strategies.

- One participant recommended amending the list of stakeholders responsible for the application of the management strategy from the full list of stakeholders in (**Appendix 5 Part 3)** to only managers, subjects (staff) and a facilitator or external consultant as shown in the updated version of **Table 23**. This idea was supported by the analysis of the results, since the choices were almost exclusively relevant to these stakeholders.

- A system analyst recommended that for each choice, participants should specify whether their choices of application modalities would help to mitigate the risk itself or the side effects. The supporting document was amended to reflect this point.

- At the end of the activity, a subject (staff) participant emphasised the enjoyment and usefulness of the process, and added "*Using the cards in the previous activity to map the management strategies to the risk and using checkboxes to specify the applications allowed us to engage more and to enjoy the activities*".

- After the task was completed, a facilitator in each group discussed the results with the participants and ensured that they all were satisfied with the final results. Although the participants agreed that they had difficulty in understanding the process at first, they reported that they had been guided through the steps and activities of the process very smoothly.

8.2.2.5   *ILLUSTRATING EXAMPLE OF THE ACTIVITIES*

The following provides an illustrative example of the participants' choices through the activities involved in the method. Moreover, **Table 30** provides a sample of the answers delivered during the validation different activities:

In the checklist tool, question (**d**) in the **Personal and social** category was **Are the interests of subject (staff) participants with the same task or group not conflicted?** This allowed participants to detect a source of risk in the following scenario: *Despite being interested only in his PhD research, Thomas has been added into one of the research groups in the department*. This helped them to identify **free riding** as a potential risk occurring in the workplace.

In the **mapping** process, they specified *commitment*, *random monitoring* and *peer rating* as management strategies to deal with this risk. In a later iteration of the mapping process, they decided to remove the *peer rating* management strategy, as it might be bad influence in a collaborative environment.

In the last activity, for *commitment* they decided the following: the purpose was to **prevent the risk**; the application style was **complementary** for all of the subjects (staff); the time frame of application was **once** at the design stage, before starting at the workplace; and the stakeholders were the **facilitator** and the **subjects**.

For *random monitoring*, they specified the following management strategies: the purpose was to **prevent the risk**; the application style was **moderated** and **in parallel** with **self-assessment**; the time frame of application was **once** at the run-time stage; and the stakeholders were **management**.

TABLE 34: SAMPLE OF ANSWERS FOR THE METHOD ACTIVITIES

Case study quote	Checklist risk factor	Risk	Management strategy	Modalities of application	Side-effect
"The department decided to add an online leader board that was visible to all"	**Category**: technical **Risk item**: d transparency level	**R16**: Infringe autonomy **R19**:Lack of group coherence	MS18: Anonymity	**Purpose**: reduce likelihood **Style**: in parallel (self-assessment) **Time**: one stage **Stakeholders:** Management	Kill the joy Affect right level of competition
"Students in each office work collaboratively"	**Category**: task **Risk item**: c collaboration level	**R1**: Free riding **R13**: lack of engagement	**MS10**: peer-rating	**Purpose**: identify limitation **Style**: in parallel (managerial level monitoring) (anonymity) **Time**: one stage **Stakeholders**: subjects (staff)	Negative effect on team coherence
"incentive in the form of a voucher for £500"	**Category**: reward **Risk item**: b Nature of reward	**R14**: reduce the quality **R15**: social loafing	**MS20**:Acknowledgment of individual efforts	**Purpose**: positivity encouragement **Style**: Individual **Time**: one stage **Stakeholders**: management	N/A

8.2.3 THIRD SESSION RESULTS: REVIEWING THE SUPPORTING DOCUMENTS

This session was implemented immediately after finishing the second session. All of the participants in the second session took part in this session, which lasted half an hour.

In the final session, all participants were given a document with the names of the documents used in the activities and asked to evaluate them in relation to the main criteria mentioned in **Section 8.1.1**. This session lasted for around half an hour. In general, most of their comments were positive regarding the usefulness, clarity, coherence, completeness and effectiveness of the documents. They provided some comments and suggestions as follows:

- The scenario generation criteria document **D4** is general, and does not provide specific guidance. They also emphasised the need to add the checklist tool as a way to decide when the scenarios had covered the required number of cases.

- Several amendments were suggested to the checklist documents **D5** and the modalities of application **D9** in relation to adding some elements and some language corrections, as explained in **Section 8.3.2**.

- Regarding the checklist tool document **D5**, there was a debate regarding the use of the cards with the checklist table. The final decision was to keep both of them and to offer the choice of using either of them.

- In relation to the mapping activity and the management strategy in document **D7**, participants suggested the need for further guidelines in order to reduce the discussion time. However, this step depends on the participation of the related stakeholders rather than using a document to guide the mapping decisions.

- To improve clarity, a participant suggested explaining the terminology used in **D7**; this was then confirmed and added to the document, as shown in the (**Appendix 3 Part 4**).

8.3 DISCUSSION

Based on an analysis of the evaluation results, this section will discuss the findings in relation to the quality criteria, the updates and amendments and the threats of evaluation.

8.3.1 QUALITY CRITERIA FOR THE GAMRISK METHOD

This section will review the validation results in relation to the five criteria defined in the goals of the validation study, as discussed in **Section 8.1.1**.

- **Usefulness**: As mentioned earlier, participants highlighted the usefulness of the activities in guiding them through the process in a straightforward way. Furthermore, the materials provided were supported them in focusing the discussion on specific cases. For example, they mentioned that the checklist was a very useful tool allowing them to look specifically at the case study rather than taking a general view.

  As discussed above, the usefulness of the method was mentioned by a manager participant in the third session when the discussion reflected on the overall process; he said "*The steps involved in the risk identification stage moved from the general to the specific, which made the process really useful*". In addition, communication between participants in the sessions was focused on aspects such as the social structure and the goals of the work environment, rather than focusing only on the motivation system without the use of the **GamRisk** method. The usefulness of the method was also seen in the involvement of people from a variety of related backgrounds and experience in the session, in terms of giving decisions that were balanced between different views, for example those of system analysts and gamification developers, who focused only on the properties of the system, and the end-users, managers, business managers and psychologists, who looked at the other related aspects such as personal, social and business factors. This criterion was reflected in the third question in **Section 8.1.4**, which concerns the ways in which the method and its supporting materials provided can assist participants' decisions in each activity.

- **Clarity**: This was an important aspect for discussion in the evaluation study. Participants' suggestions, especially in the third session, mainly involved ideas for improving the clarity of visualisation of the materials. However, clarity was clearly integrated in the materials in order to engage participants more in the activities. For example, the three colours (green, yellow, red) used in documents **D5** and **D6** to reflect

the type of risks were intended to improve the clarity of the materials. In addition, the cards used in the checklist and in the management strategies were designed to improve the clarity of the process.

The involvement of participants from a variety of backgrounds was intended to increase the clarity of the tasks and direct the participants' decisions. In particular, the involvement of a facilitator in the decision-making sessions was an essential aspect in governing the discussions and encouraging collaborative work. A high level of clarity was clearly observed in the session, and participants became familiar with the activities, meaning that the number of interactions with the observer dropped significantly in the last activity.

- **Coherence**: This was a key aspect in the design of the **GamRisk** method. In each activity, participants were required to store the results in documents which became the main supporting document in the following activity. Participants agreed that each step provided an effective foundation for the following activity. One participant commented in this regard that "*The process guided us through its documents, because the outcome of each step was the input for the following one*". The resulting document was approved in the last activity, where all of the findings of the previous activities were included in the proposed final artefact.

  Coherence was also a key feature of the second stage of the method, which concerned the risk mitigation process. However, in the first stage (the risk identification stage), some participants did not agree on the level of coherence; they argued that some of the steps, such as the scenario step, could be combined with the modelling step in order to achieve the same requirements and save time. It was highlighted that the scenario step was intended to focus the discussion onto specific cases. In addition, all subject participants agreed that this step enriched their thinking about the proposed design.

- **Completeness**: This aspect of the method, including its activities, supporting documents and stakeholder participation, received some suggestions for improvement in

order to achieve a better risk identification and mitigation process. The updated suggestions and amendments to the method are described in **Section 8.3.2**.

In general, participants did not think that the method needed more steps or components, except those mentioned in the following section. However, the supporting documents might need extra materials to facilitate the decisions made in relation to the mapping of the management strategies and the gamification risks, and a document may be necessary to facilitate the trade-off activity. In summary, the final artefact reflects the level of completeness of the method, where both groups finally produce a full document explaining the potential risks and side-effects and possible solutions to mitigate them. This criterion fulfils the second question in **Section 8.1.4** in relation to how the method and its activities can help to satisfy participants about decisions on mitigation of the identified gamification risks.

- **Effectiveness**: The effectiveness of the method is demonstrated in the ability of the method to identify and mitigate gamification risk. The participants agreed that the activities and supporting documents of the method were very overwhelming for them during this process. The numbers of risks identified increased dramatically when using the method compared to the risks identified without the method. Its effectiveness was also seen in the ability of participants to recognise hidden risk factors in the proposed design, such as those in relation to the social structure and personal factors. This indicates that the method effectively guided the participants to identify and mitigate gamification risks in the proposed design. This answers the question in **Section 8.1.4** regarding how the method and its activities can help to identify gamification risks in the proposed design.

8.3.2 UPDATES AND AMENDMENTS

This section summarises the main updates and amendments to the activities of the **GamRisk** method and the supporting documents after conducting the evaluation study. The new versions

of the method, the activity diagram and the supporting documents were updated in the method chapter (**Chapter 7**) while the previous versions are present in **Appendix 5.**

1. In the main steps of the method, as shown in **Figure 17**, the scenario generation step and the checklist tool were updated, and will now be implemented in parallel. This will help in defining the number of scenarios needed. Moreover, both steps are ultimately providing a scope in the risk identification process.

2. In the **GamRisk** method activity diagram **Figure 20**, the following changes have been added:

   a. The gamification developer stakeholders will now participate in the condition to decide if a critical mistake has been identified. This will help in specifying whether the proposed design has a critical issue and requires the process to return to the first step to amend the proposed design of the system or the organisational structure.

   b. The subject (staff) stakeholders are added to the scenario generation activity.

   c. All of the participants involved in **activity 5** will also now participate in the checklist activity (activity **4)**.

3. In the checklist tool, four main changes have been made:

   a. A new category has been added to distinguish the goal elements from the personal and social category.

   b. A new question has been added to the social and personal category regarding conflicts of interest between people in the same group (Are the interests of subject (staff) participants within the same task or group without conflict?).

   c. Amendments have been made to the list of specific risks linking the risk factors in the checklist **Table 18** with the list of risks in **Table 19**.

   d. In the header of the list of risks in the checklist table, the word **'Potential'** has been added to indicate that the risks identified in the table are not exclusive.

4. The list of stakeholders in the modalities of application table **D9** has been changed to contain only management, subjects, facilitator and external consultant, rather than all of the stakeholders listed in **Table 16**.

5. In document **D9**, a tick box has been added to specify whether the management strategy applications are intended to mitigate the risk itself or its side-effect.

8.3.3   THREATS TO VALIDITY

This section will discuss the threats which might affect the quality of the validation process.

- The case used in the validation was briefly summarised from an academic environment to meet the backgrounds of most of the participants, the description provided were enough for the purpose of the study and the time restriction of the validation study.

- Since the participants were given incentives in return for their participation, this may have influenced their judgments and affected the trustworthiness of their answers. However, it is a really common procedure used in research and participants were asked to share their own views and the researcher did not disclose what he expected from the activities. This means it is unlikely to have actually affected the participants' answers.

- Although participants had the required level of background and experience suggested in the method, the validation session did not involve participants with a policy-making background. Policy-makers could be needed in the mitigation stage, for example when setting up agreements as a management strategy, to determine the best configuration of such a strategy. To minimise this effect, participants were advised to highlight where they thought such a person may be needed and this was added in the final method.

- Although the researcher emphasised that the choices provided in the supporting documents were not exclusive and that participants could add their personal perceptions, these might have had some influence on their thinking. However, participants did bring new elements, meaning that their thinking was not restricted.

- Although the validation study would have benefited from a larger number of participants to increase the diversity of views and ideas, to the time and budget constraints of the study meant that only 8 participants could be recruited. However, these participants came from a variety of background meaning that diversity of views was still achieved.

- The researcher was involved as a "**participant as observer**" in the session for purposes of clarity and understandability, however, he had no influence on participants' choices or ideas. In the preparation period before starting each session, the researcher also made sure to avoid over-explaining the task and the materials, as this might have biased and affected the creativity of the participants.

- The time limit given to the participants for each activity might have affected the quality and competence of their results. However, the third session was designed to overcome this limitation by providing free time to the participants to add their insights and comments on all of the activities involved in the validation session.

8.4   SUMMARY

This chapter has discussed the approach to the evaluation of the proposed **GamRisk** method for risk identification and mitigation. The supporting materials were also evaluated to examine how they could help in supporting the method and its activities. A case study approach was utilised to examine the ability of the **GamRisk** method to achieve the expected outcomes. Qualitative data were collected by the researcher through observation of the sessions and analysis of the notes and documents collected in the sessions.

9.   CHAPTER 9: CONCLUSION AND FUTURE WORK

Gamification is used in workplaces to increase staff desire toward implementing tasks and achieving certain goals. The set of rewarding and gaming mechanics used in gamification includes leaderboards, badges, points, avatars reflecting individual and collective performance, levels and status. An example of gamification techniques in a call centre may involve giving rewards to individual staff members or teams based on the amount and speed of answered calls and customer feedback. Despite the benefits, applying gamification in the enterprise has potential risks. For example, the way of calculating, assigning, and displaying rewards may increase the chance for adverse work ethics including free-riding, work intimidation, and lack of group cohesion (Forsyth 1992, Shahri et al. 2014). Despite the recognition of these risks, no reference models and systematic methods, as mentioned in the literature chapter, have been developed to evaluate and mitigate these risks (Pedreira et al. 2015a). These risks have a peculiar nature due to their intermingled relation with human factors such as motivation, personality, enterprise culture and group dynamics.

As a result, this research advocates the need for a systematic method to assess the gamification risks in a proposed gamification design and using participatory decision style as an approach for the purpose of analysing gamification risks and proposing resolution strategies. Moreover, employing techniques such as role-playing and scenarios which can help to explore and uncovering ethical concerns through groups' discussions and prototyping exercises. Also, this research recommends studying how to integrate the risk identification processes, which should take an iterative participatory style with the systems' development life cycle activities and other models including requirements models.

This research utilised the results presented in **Chapter 4**, **5** and **6** and developed a method for gamification risk management that includes risks detection and assessment alongside with their mitigation strategies from the early stages of the system analysis. This started by first exploring and understanding people interactions with such systems and how and what risks might affects the validity of the system to achieve its predesigned goals. This was achieved by

conducting an observation study for two months in two large companies that utilised gamification solutions for their business activities. In addition, this required exploring practitioners and psychologists and system engineers for their views and comments on the results and on the research main focus. Moreover, exploring strategies which could help to manage the identified risks and how it could be applied for effective implementation of the system in teamwork places.

The proposed method (**GamRisk**) is dividing the risk assessment into two stages, the risk identification process and risk mitigation process. For the risk identification, the thesis has utilised a checklist-based risk identification tool. The checklist has been developed based on the results of the implemented extensive studies around the gamification risk factors in **Chapter 4** and through an iterative refinement process with practitioners who involved in the interviews and in the focus groups of this research. For the risk mitigation process, the thesis has proposed **22** management strategies through series of empirical studies with people from academia and industry with related background and a set of modalities of applications of the management strategies to increase their effectiveness and validity to manage gamification risks.

9.1 RESEARCH QUESTIONS AND OBJECTIVES REVISITED

This section discusses the thesis objectives and revises them according to the thesis findings

Objective 1: To Conduct a Literature Review of Gamification and its Related Topics

To address this objective, the thesis has reviewed gamification main topics including its frameworks and approaches and also the related topics such as persuasive technology and serious games. In addition, another focus was to cover the theoretical literature in motivation, which helps to understand users' needs and requirements from such systems. The main focus was on the methods and approaches for risks of software project management in order to explore the design principles and practises which can assist the design of the research methods of this thesis.

The thesis also reviewed and reanalysed previous works which were done in (Shahri et al. 2014, Shahri et al. 2016) this was to explore initial results of gamification risks and risk factors

as well as to develop an initial template of them in order to start the investigation study presented in **Chapter 4**.

The main result of this objective was that the gamification system is associated with risks especially with not bespoke product design thereby meaning that the system design is differ based on different elements such as goals, contexts, stakeholders. Another main result of this objective is that although the literature has several methods for risk identifications process such as scenarios, brainstorming and examination of past situations, there is still lack of a good mechanism to help project managers for potential risk factors identifications.

Objective 2: To Explore the Risk Factors and Gamification Risks when applied on Teamwork Environment

The reanalysis of the studies implemented in (Shahri et al. 2014, Shahri et al. 2016) together with the results of **Objective 1** indicated that gamification could be correlated with risks such as (e.g. social loafing, feeling of unfairness, unofficial clustering). This objective was meant to investigate the main risk factors might affect the system and the type of risks might occur in the workplace. This objective was achieved through observation study in two large business workplaces for two months followed by interviews with practitioners and specialises in the field. This objective resulted in **five** main risk factors with **15** sub-factors. In addition, the identification of **20** types of risks which these risk factors might cause to the teamwork environment. The results of this objective were validated in focus groups with people from various related background and using techniques like card sorting and scenarios.

Objective 3: To Explore Strategies and Design Principles to Manage Gamification Risks on Teamwork

This objective was to explore management strategies which could help to mitigate the risks identified in **Objective 2**. Several empirical studies involving managers and workers were conducted including interviews and focus groups in order to achieve the aim of this objective. The result of this objective was the identification of **22** management strategies which can be used to mitigate gamification risks for different important purposes. In addition, the identified management strategies were classified under three main categories based on their natures and

purposes to (i) setting up agreements and informing participants, (ii) checking and reporting and (iii) appreciation and controlling.

Objective 4: To Identify Different Modalities of Application of the Management Strategies for Gamification Risk Identification and Mitigation Process

This objective was built on the results obtained from **Objective 3**. This objective has two primary aims (i) mapping the proposed management strategies in **Objective 3** with the most applicable gamification risks in identified **Objective 2** and (ii) identifying set of modalities of application of the proposed management strategies in **Objective 3**. To achieve this objective, two focus groups, with the employment of 13 scenarios (see **Appendix 3 Part 6**) presenting the potential risks situations, were conducted, followed by ten interviews to validate the results and explore further results. The results of this objective were the mapping of the classified risks with the most appropriate categories of management strategies

Moreover, the other result was identified different modalities of application of the management strategies which include the different purposes of usage, styles of applications, times of suitability and related stakeholders to configure the application of the strategy. These modalities of application are meant for effective implementation of the management strategies to increase the validity and success of the system application in the teamwork places. The objective will also provide foundations of these modalities of applications in order to provide guidance to facilitate making decisions upon these modalities for effective gamification risk mitigation process.

Objective 5: To Develop and Evaluating a Method for Gamification Risks Identification and Mitigation

The results of **Objective 2** were utilised for further empirical investigation in order to develop a checklist-based risk identification tool. This was meant to facilitate the first aspect of the method which is the risk identification process. All of the proposed resulted of the previous objectives were further reanalysis and utilised in order to develop a systematic gamification assessment method to assist in gamification risk identification and mitigation.

All of the data obtained in the previous objectives were combined, and analyses to develop a **GamRisk** method which involves two main stages. The **risk identification** stage which has three steps, (i) modelling the proposed design, (ii) generating scenarios to scope the process and (iii) applying checklist tool for the risk identification. The second stage is the **risk mitigation** stage. This stage has two main steps, (i) the mapping of the management strategies with the appropriate gamification risk and (ii) the modalities of application of the management strategies to effectively mitigate the identified risks. The modalities of applications are about (i) when to apply the management strategy, (ii) for which purpose, (iii) in what time and (iv) who is responsible for applying it. The method adopted a participatory approach to involve subject (staff) and managers to measure their understanding and the usefulness of the method for such participants.

For the validation, the objective utilised a case study approach (University department) to validate the proposed artefacts in practical proposed gamification design. The evaluation study involved related stakeholders like (system analysts, managers, subject, psychologist behaviour change specialists and gamification developers) in decision-making sessions to assess the ability of the proposed method to assist for risk identification and mitigation process. The method was assessed based on a set of qualities (usefulness, clarity, coherence, completeness and effectiveness) from stakeholders' points of view. Three sessions were involved in the validation study. The first session was meant to identify gamification risk in the proposed case without the aid of the **GamRisk** method while the second session which has implemented in a separate day was to evaluate the gamification design in the proposed case with the aid of **GamRisk** method. The third session was to reflect on the results and allow for discussions and evaluating the materials.

The overall finding of this objective was that participants were able to identify the risks in the proposed case in a comprehensive and less time and efforts as it is described in more details in **Chapter 8 (Section 8.2).** Moreover, they were satisfied with the mitigating decisions made to manage the identified risks. In addition, the methods supporting documents used in the activities were guided and informed their decisions. At the end of the sessions, participants were asked to

evaluate the method and its supporting documents based on the set of quality attributes which were specified as criteria for the evaluation study (the usefulness clarity, coherence, completeness and effectiveness).

9.2 CONTRIBUTION TO KNOWLEDGE

This thesis has contributed to the knowledge of the software risk management area. The case particularly was the risks of gamification system as a motivation element for a teamwork environment. This section is highlighting the main contributions of the thesis.

Identifying the main risk factors and exemplars of risks of the gamification system

This thesis has explored the main factors which may trigger negative effects on the successful implementation of the system in teamwork places. This was presented in **Chapter 4**. A main **five** risk factors and **15** sub-factors require careful consideration in the design of such a system to ensure success and managed system implementation. In addition, this thesis has identified **20** exemplars of risks which have a high chance to occur as a result of less consideration of the risk factors in the design of the system.

Exploring management strategies for the gamification risks

The thesis has proposed **22** management strategies which can help to manage the identified gamification risks. The exploration was from both the psychological and management perspectives which could help to minimise workplaces negative impact related to gamification. Also, categorisation of these strategies based on their natures and purpose of use into three main aspects.

Identifying modalities of applications of the proposed management strategies

This thesis has proposed various modalities of applications for the best application of these management strategies for a well-managed and healthier implementation of the gamification system in a teamwork environment. The representation of modalities revolved around the following **four** areas and explained in more details with their characteristics in **Chapter 6**:

- **Application purposes:** Risk resolution, alleviation, prevention, positivity encouragement and reduce the likelihood

- **Application styles**: Directive, complementary, moderated, in parallel, iterative

- **Application time**: One stage, Two-stage, Continuous, Planned in advance and executed at runtime

- **Stakeholders**: Management, subject (staff), facilitators, external authority

The thesis has also developed guidance to facilitate the choices in relation to each modality of the application aspect of the management strategies.

Proposing a checklist-based risk assessment tool

As discussed earlier in details, one of the main contributions of this thesis is the checklist tool proposed in **Chapter 7**. The checklist is a risk identification tool which can be used during the decision-making session at the early stage of the gamification system design. The checklist presented in **Table 18** has been developed based on implementing extensive studies around the gamification risk factors in both industry and academic environments and through an iterative refinement process with practitioners who involved in the interviews and in the focus groups of this research. The checklist is meant to be used by managers, subject (staff) and system analysts' stakeholders to help them to identify gamification risk factors and risks in a proposed design.

Developing a gamification risk identification and management method

Despite the published software projects risk management methods; there is a lack of a systematic engineered method for gamification risk identification and mitigation. As the main contribution of this thesis to the knowledge, a participatory method to identify and mitigate gamification risks has been developed. The method has two stages and five main steps:

- **Risk Identification Stage:**

  - **Define scope**: models creation

  - **Identify potential situations**: scenarios generations

  - **Determine potential risks**: Checklist-based inspection

- **Risk Mitigation Stage**:

  - **Map risks**: Mapping management strategies with gamification risks

■ **Evaluate and decide**: Modalities of application of the management strategies

The thesis also proposed a detailed diagram based on the Business Process Model and Notation (**BPMN**) presented in **Figure 20** which involves **seven** activities. The purpose of this diagram is to provide a detailed explanation including the supporting documents used and the stakeholders' participation for the method main steps. In addition, a description of each stakeholder involved in the method steps and their main roles are presenting in **Table 22**.

9.3 THESIS LIMITATIONS

Although the research has achieved its main objectives, it has some limitations which has existed through the research different stages. Some of them required further investigations to overcome them while others are associated with such qualitative-based research. The following points explaining the thesis main limitations:

- The investigation process in this thesis mainly focused on some sort of gamification elements such as badges, leaderboards, points and avatars because they were the commonly used elements in the targeted research fields and most of the participates involved in the research studies were familiarised with such type of gamification elements. Although the research tried to targeted different gamification elements, the results presented in this thesis might be limited and not applicable to every type of gamification elements.

- This thesis has mainly targeted the teamwork implementation environments of gamification either with individual tasks or collaborative tasks. This helped to explore the effect of the system with the social and organisational context and not only limiting the results on the personal perceptions and individual acceptance of such motivational techniques.

- The collected data over an observational study might be affected by the researcher bias or lack of understanding of the social context (Sunders et al. 2009). In **Chapter 4** the results obtained through conducting an observation study for two months in two large business companies. To reduce such limitation, the researcher conducted follow-up

interviews with practitioners, managers and end-users to reflect on the results and confirm the final outcomes.

- In **Chapter 7,** in the proposed checklist tool, it was discussed that the results of the identified risks might have three levels of risks. Firstly, risks identified with **Green,** which refers to the acceptable level of risks. Secondly, risks with **Yellow** colour, which indicated the type of risks requires a mitigation strategy. Finally, the risks distinguished with **Red** refer to the type of risks requires a modification in the original design of the system. Although, the method is a participatory-based with the participation of gamification developers and system analysts which could help to decide the level of severity of the identified risks, the main focus of this research was on the **Yellow** type of risks that can be mitigated using different management strategies. This mainly limited the focus of the method and the validation study on the **Yellow** and **Green** type of risks. The **Red** type of risks would require further investigations, and this will be one of the main focus on future research.

9.4   FUTURE WORK

As mentioned in the last point of the previous section, the level of severity of gamification risks still required future research and investigations. The future work could be to maximise the proposed **GamRisk** method to cover the severity level of the risk and to provide more theoretical-based guidance to decide the level of severity and to provide technical guidance for the **Red** type of risks and the changes required in the design itself of the proposed case.

Moreover, another future work might focus on studying how to integrate the risk identification processes, which should take an iterative participatory style with the systems' development life cycle activities and other models including requirements models. In addition, the trade-offs between different possible risks from one hand and between management strategies and their potential side-effects require further exploration and facilitation with the implementation of theoretical-based decisions.

Furthermore, a focus on developing systematic informed elicitation techniques like role-playing, rehearsal, simulation and storyboarding which mainly used in this thesis in the scenario

generation step of the proposed method. This would help to govern the implementation of such techniques and provide useful cooperative techniques for the interactions between users and system analysts or researchers to be able to elicit and understand the goals, needs and values of the users in a comprehensive and effective way.

10.   REFERENCES

Abras, C., Maloney-Krichmar, D., and Preece, J., 2004. User-Centered Design. *Sims, W.(2004) Encyclopedia of Human Computer Interaction.*

Ahn, von, L., 2006. Games with a Purpose. *IEEE Computer*, 39 (6), 92–94.

Alderfer, C. P., 1969. An empirical test of a new theory of human needs. *Organizational Behavior and Human Performance*, 4 (2), 142–175.

Algashami, A., Cham, S., Vuillier, L., Stefanidis, A., Phalp, K., and Ali, R., 2018. Conceptualising Gamification Risks to Teamwork within Enterprise. *In*: *The Practice of Enterprise Modeling*. Cham: Springer, Cham, 105–120.

Algashami, A., Shahri, A., McAlaney, J., Taylor, J., Phalp, K., and Ali, R., 2017. Strategies and Design Principles to Minimize Negative Side-Effects of Digital Motivation on Teamwork. *PERSUASIVE*, 10171 (2), 267–278.

Algashami, A., Vuillier, L., Alrobai, A., Phalp, K. and Ali, R., 2019. Gamification Risks to Enterprise Teamwork: Taxonomy, Management Strategies and Modalities of Application. Systems, 7(1), p.9.

Alter, S. and Sherer, S. A., 2004. A General, But Readily Adaptable Model of Information System Risk. CAIS. *The Communications of the Association for Information Systems*, 14(1),35.

Aparicio, A. F., Vela, F. L. G., Sánchez, J. L. G., and Montes, J. L. I., 2012. Analysis and application of gamification. *In:*. *Presented at the the 13th International Conference*, New York, USA: ACM Press, 1–2.

Apter, M.J. and Kerr, J.H. eds., 1991. *Adult play: A reversal theory approach*. Amsterdam: Swets & Zeitlinger.

Ashforth, B. E. and Mael, F., 1989. Social Identity Theory and the Organization. *Academy of Management Review*, 14 (1), 20–39.

Avdoshin, S. M. and Pesotskaya, E. Y., 2019. Software risk management. *In:*. *Presented at the 2011 7th Central and Eastern European Software Engineering Conference in Russia* (CEE-SECR 2011), IEEE, 1–6.

Bajdor, P. and Dragolea, L., 2011a. The gamification as a tool to improve risk management in the enterprise. *Annales Universitatis Apulensis: Series Oeconomica.* 13 (2), 574.

Ball, K. S. and Margulis, S. T., 2011. Electronic monitoring and surveillance in call centres: A framework for investigation. *New Technology, Work and Employment*, 26 (2), 113–126.

Barata, J., da Cunha, P. R., and Abrantes, L., 2015a. Dealing with Risks and Workarounds - A Guiding Framework. *PoEM*, 235 (Chapter 10), 141–155.

Baxter, G. and Sommerville, I., 2011. Socio-technical systems: From design methods to systems engineering. *Interacting with Computers*, 23 (1), 4–17.

Baumeister, R. F. and Heatherton, T. F., 1996. Self-regulation failure: An overview. Psychological Inquiry, 7 (1), 1–15.

Bell, E., Bryman, A., and Harley, B., 2018. *Business Research Methods*. Oxford University press.

Bellotti, F., Berta, R., De Gloria, A., Lavagnino, E., Antonaci, A., Dagnino, F. M., and Ott, M., 2019. A Gamified Short Course for Promoting Entrepreneurship among ICT Engineering Students. *In:. Presented at the 2013 IEEE 13th International Conference on Advanced Learning Technologies* (ICALT), IEEE, 31–32.

Bellotti, F., Kapralos, B., Lee, K., Moreno-Ger, P., and Berta, R., 2013. Assessment in and of Serious Games: An Overview. *Advances in Human-Computer Interaction*, 2013 (2), 1–11.

Berdichevsky, D. and Neuenschwander, E., 1999. Toward an ethics of persuasive technology. *Communications of the ACM*, 42 (5), 51–58.

Blohm, I. and Leimeister, J. M., 2013. Gamification. *WIRTSCHAFTSINFORMATIK*, 55 (4), 275–278.

Bloor, M. and Wood, F., 2019. *Keywords in Qualitative Methods*. 1 Oliver's Yard, 55 City Road, London England EC1Y 1SP United Kingdom : SAGE Publications Ltd.

Boehm, B. W., 1991. Software risk management: principles and practices. *IEEE Software*, 8 (1), 32–41.

Bogost, I. 2011. Gamasutra - Persuasive Games: Exploitationware. Retrieved from http://www.gamasutra.com/ view/feature/6366/persuasive_games_exploitationware.php

Braun, V. and Clarke, V., 2006a. Using thematic analysis in psychology. Qualitative Research in Psychology, 3 (2), 77–101.

Brignall, T., 2002. The new panopticon: The internet viewed as a structure of social control. *Theory and Science*, 3 (1).

Brinkkemper, S., 1996. Method engineering: engineering of information systems development methods and tools. Information and Software Technology, 38 (4), 275–280.

Bunchball Inc, 2010. gamification 101: introduction to the Use of Game Dynamics to influence Behavior. White paper. Retrieved from www.bunchball.com/gamification101.

Campbell, J. E. and Carlson, M., 2002. Panopticon.com: Online Surveillance and the Commodification of Privacy. *Journal of Broadcasting & Electronic Media*, 46 (4), 586–606.

Carroll, J.M. 1997. Scenario-based design. In M. Helander & T.K. Landauer (Eds.) *Handbook of HumanComputer Interaction, Second Edition*. Amsterdam: North Holland,383-406.

Castro, J., Kolp, M., and Mylopoulos, J., 2002. Towards requirements-driven information systems engineering - the Tropos project. *Inf. Syst.*, 27 (6), 365–389.

Cechanowicz, J., Gutwin, C., Brownell, B., and Goodfellow, L., 2013. Effects of gamification on participation and data quality in a real-world market research domain. *Gamification*, 58–65.

Charmaz, K., 2006. *Constructing Grounded Theory*. London: Sage.

Chidambaram, L. and Tung, L. L., 2005. Is Out of Sight, Out of Mind? An Empirical Study of Social Loafing in Technology-Supported Groups. *Information Systems Research*, 16 (2), 149–168.

Cialdini, R. B.,1984. *Influence*. New York, NY: Quill.

Coghlan, D., 2019. *Doing Action Research in Your Own Organization*. London: Sage.

Cohen, L., Manion, L., and Morrison, K., 2013. *Research Methods in Education*. London, UK and New York, NY: Routledge; 2008:405

Collins, H., 2010. *Creative research: The theory and practice of research for the creative industries*. Switzerland: AVA Publishing.

Consolvo, S., Klasnja, P. V., McDonald, D. W., and Landay, J. A., 2009. Goal-setting considerations for persuasive technologies that encourage physical activity. *PERSUASIVE*, 350, 1.

Creswell, J. W., 2014. *Research design : qualitative, quantitative, and mixed methods approaches*. Thousand Oaks : SAGE Publications.

Corti, K., 2006. Games-based Learning; a serious business application. *Informe de Pixel Learning*, 34(6),1-20.

Dalpiaz, F., Giorgini, P., and Mylopoulos, J., 2013. Adaptive socio-technical systems: a requirements-based approach. *Requirements engineering*. 18(1), 1–24.

De Colle, S., 2005. A stakeholder management model for ethical decision making. *International Journal of Management and Decision Making*, 6 (3/4), 299-314.

Denham, S. A., 1986. Social Cognition, Prosocial Behavior, and Emotion in Preschoolers: Contextual Validation. Child Development, 57 (1), 194–2.

Deterding, S., 2012. Gamification - designing for motivation. *Interactions*, 19 (4), 14.

Deterding, S., Dixon, D., Khaled, R., and Nacke, L., 2011. From game design elements to gamefulness - defining "gamification". *In:*. *Presented at the International Academic MindTrek Conference Envisioning Future Media Environments*, Tampere, 9–15.

Deutsch, M., 1949. An Experimental Study of the Effects of Co-operation and Competition Upon Group Process. *Human Relations*, 2 (3), 199–231.

Dey, P. K., Kinch, J., and Ogunlana, S. O., 2007. Managing risk in software development projects: a case study. *Industrial Management & Data Systems*, 107 (2), 284–303.

Diaz, L., Reunanen, M., and Salmi, A., 2009. Role playing and collaborative scenario design development. *In:*. *Presented at the DS 58-6: Proceedings of ICED 09, the 17th International Conference on Engineering Design*, 79–86.

Dion, K. L., 2000. Group cohesion: From 'field of forces' to multidimensional construct. *Group Dynamics: Theory, Research, and Practice*, 4 (1), 7–26.

Dogan, H., Pilfold, S.A. and Henshaw, M., 2011, October. The role of Human Factors in addressing Systems of Systems complexity. In 2011 IEEE *International Conference on Systems, Man, and Cybernetics* (pp. 1244-1249). IEEE.

Eason, K. D.,1987. *Information technology and organizational change*. London: Taylor and Francis.

Ellemers, N., De Gilder, D., and Haslam, S. A., 2004. Motivating individuals and groups at work: a social identity perspective on leadership and group performance. *Academy of Management Review*, 29 (3), 459–478.

Erez, M. and Zidon, I., 1984. Effect of goal acceptance on the relationship of goal difficulty to performance. *Journal of Applied Psychology*, 69 (1), 69–78.

Ethics, C. C. F. B., 1999. *Principles of Stakeholder Management*. Clarkson Centre for Business Ethics, Joseph L. Rotman School of Management, University of Toronto.

Farzan, R., DiMicco, J. M., Millen, D. R., Dugan, C., Geyer, W., and Brownholtz, E., 2008. Results from deploying a participation incentive mechanism within the enterprise. *CHI*, 563–572.

Fogg, B. J., 2002. Persuasive Technology: Using Computers to Change What We Think and Do Amsterdam: Morgan Kauffmann: Interactive Technologies.

Fogg, B. J., 2009. Creating persuasive technologies - an eight-step design process. In Persuasive Technology. Fourth International Conference, *PERSUASIVE* (pp. 1e6). Claremont, CA, USA.

Forgas, J. P., 1998. On feeling good and getting your way: Mood effects on negotiator cognition and bargaining strategies. *Journal of Personality and Social Psychology*, 74 (3), 565–577.

Forsyth, D., 1992. *An introduction to group dynamics*. Brooks/Cole Publishing Company: Pacific Grove, CA, USA.

Forsyth, D. R., 2014. *Group dynamics* (6th ed.). Wadsworth, CA: Cengage Learning.

Friedman, B., Kahn, P. H., Borning, A., and Huldtgren, A., 2013. Value Sensitive Design and Information Systems. *In*: *Early engagement and new technologies: Opening up the laboratory*. Dordrecht: Springer, Dordrecht, 55–95.

Gay, L. R., Mills, G. E., & Airasian, P. W., 2006 . *Educational research: competencies for analysis and applications*. Upper Saddle River, NJ: Pearson Merrill Prentice Hall.

Gill, J. and Johnson, P., 1997. *Research Methods for Managers*. London: SAGE Publications Limited.

Gough, P. A., Fodemski, F. T., Higgins, S. A., and Ray, S. J., 2019. Scenarios-an industrial case study and hypermedia enhancements. *In*:. Presented at the 1995 IEEE International Symposium on Requirements Engineering (RE'95), IEEE Comput. Soc. Press, 10–17.

Gram-Hansen, S. B., 2016. The EDIE Method – Towards an Approach to Collaboration-Based Persuasive Design. *In*: *Persuasive Technology*. Cham: Springer International Publishing, 53–64.

Greenberg, B. S., Sherry, J., Lachlan, K., Lucas, K., and Holmstrom, A., 2008. Orientations to Video Games Among Gender and Age Groups. *Simulation & Gaming*, 41 (2), 238–259.

Griffiths, M. D., Davies, M. N. O., and Chappell, D., 2003. Breaking the stereotype: The case of online gaming. *Cyberpsychology and Behavior*, 6 (1), 81–91.

Grønbæk, K., Kyng, M., and Mogensen, P., 1997. *Toward a Cooperative Experimental System Development Approach*. In M. Kyng and L. Mathiassen (eds.): Computers and Design in Context. Cambridge, MA: MIT Press. 201–238

Guba, E. G.,1990. The paradigm dialog. *In Alternative Paradigms Conference*, Mar, 1989, Indiana U, School of Education, San Francisco, CA, US. Sage Publications, Inc.

Guida, G., Lamperti, G., and Zanella, M., 2013. *Software Prototyping in Data and Knowledge Engineering* (Vol.497). Springer Science & Business Media Dordrecht.

Guiling, L. and Xiaojuan, Z., 2011. Notice of Retraction: Research on the risk management of IT project. *In*:. *Presented at the 2011 International Conference on E-Business and E-Government* (ICEE), IEEE, 1–4.

Hamari, J., Koivisto, J., and Pakkanen, T., 2014. Do Persuasive Technologies Persuade? - A Review of Empirical Studies. *PERSUASIVE*, 8462 (6), 118–136.

Hayes, J., 2014. *The Theory and Practice of Change Management*. London: Palgrave Macmillan.

Herzig, P., Ameling, M., and Schill, A., 2017. A Generic Platform for Enterprise Gamification. *In*:. *Presented at the 2012 Joint Working IEEE/IFIP Conference on Software Architecture* (WICSA) & *European Conference on Software Architecture* (ECSA), IEEE, 219–223.

Herzig, P., Ameling, M., and Schill, A., n.d. 2012. A Generic Platform for Enterprise Gamification. *In Presented at the 2012 Joint Working IEEE/IFIP Conference on Software Architecture* (WICSA) & *European Conference on Software Architecture* (ECSA), IEEE, 219–223.

Herzig, P., Ameling, M., Wolf, B., and Schill, A., 2015. Implementing Gamification: Requirements and Gamification Platforms. *In Gamification in Education and Business, 431-450*. Springer: Cham, Switzerland, 431-450.

Herzig, P., Jugel, K., Momm, C., Ameling, M., and Schill, A., 2019. GaML - A Modeling Language for Gamification. *In*:. *Presented at the 2013 IEEE/ACM 6th International Conference on Utility and Cloud Computing* (UCC), IEEE, 494–499.

Herzig, P., Strahringer, S., and Ameling, M., 2012. Gamification of ERP systems - Exploring gamification effects on user acceptance constructs. In Presented at the Multikonferenz Wirtschaftsinformatik - Tagungsband der MKWI 2012, 793–804.

Hiltbrand, T. and Burke, M., 2011. How Gamification will change Business Intelligence. *Business Intelligence Journal.* vol. 16 (2), 8–16.

Huotari, K. and Hamari, J., 2012. Defining gamification: a service marketing perspective. In: *Proceeding of the 16th International Academic MindTrek Conference*. 17–22. MindTrek '12, ACM, New York, NY, USA.

Huotari, K. and Hamari, J., 2016. A definition for gamification: anchoring gamification in the service marketing literature. *Electronic Markets*, 27 (1), 21–31.

Horita, F.E., Assis, L.F.F.G., Castanhari, R.E., Isotani, S., Cruz, W.M. and de Albuquerque, J.P., 2014. A gamification-based social collaborative architecture to increase resilience against natural disasters. Agora. 399-410. Retrieved from http://www.agora.icmc.usp.br/site/files/ papers/horita-sbsi2014.pdf

Nonaka, I., 1994. A dynamic theory of organizational knowledge creation. *Organization science*, 5 (1),14-37.

Johnson, D., Deterding, S., Kuhn, K.-A., Staneva, A., Stoyanov, S., and Hides, L., 2016. Gamification for health and wellbeing: A systematic review of the literature. *Internet* Interventions, 6, 89–106.

Johnson, J., Irizarry, M., Nguyen, N. and Maloney, P., 2018. Part 1: Foundational Theories of Human Motivation. *Motivation 101: A Guide for Public Servants*. 1. https://stars.library.ucf.edu/motivationforpublicservants/1

Johnson, P. and Clark, M. 2006. *Mapping the terrain: an overview of business and management* research methodologies, in P. Johnson and M. Clark. (eds) Business and Management Research Methodologies. London: Sage.

Kapp, K.M., 2013. *The gamification of learning and instruction field book: Ideas into practice*. San Francisco: John Wiley & Sons.

Kensing, F. and Blomberg, J., 1998. Participatory Design: Issues and Concerns. *Computer Supported Cooperative Work (CSCW)*, 7 (3-4), 167–185.

Kensing, F., Simonsen, J., and Bodker, K., 2009. MUST: A Method for Participatory Design. *Human–Computer Interaction*, 13 (2), 167–198.

Keshlaf, A.A. and Hashim, K., 2000. A model and prototype tool to manage software risks. *In Proceedings First Asia-Pacific Conference on Quality Software,* 297-305. IEEE.

Kim, T. W. and Werbach, K., 2016. More than just a game: ethical issues in gamification. *Ethics and Information Technology*, 18 (2), 157–173.

King, D., Greaves, F., Exeter, C., and Darzi, A., 2013. 'Gamification': Influencing health behaviours with games. *JRSM*, 106 (3), 76–78.

Kirillov, A., Vinichenko, M., Melnichuk, A., Melnichuk, V. and Vinogradova, M., 2016. Improvement in the learning environment through gamification of the educational process. *International Electronic Journal of Mathematics Education,* 11(7),2071-2085.

Kitchenham, B. A., 1996. Evaluating software engineering methods and tool part 1. *ACM SIGSOFT Software Engineering Notes*, 21 (1), 11–14.

Koivisto, J. and Hamari, J., 2014. Demographic differences in perceived benefits from gamification. *Computers in Human Behavior*, 35, 179–188.

Koopmans, L., Bernaards, C. M., Hildebrandt, V. H., Schaufeli, W. B., de Vet Henrica, C. W., and van der Beek, A. J., 2011. Conceptual Frameworks of Individual Work Performance. *Journal of Occupational and Environmental Medicine*, 53 (8), 856–866.

Korn, O., 2012. Industrial playgrounds - how gamification helps to enrich work for elderly or impaired persons in production. EICS, 313–316.

Kumar, J., 2013. Gamification at Work - Designing Engaging Business Software. *In International conference of design, user experience, and usability*. Springer, Berlin, Heidelberg, 528–537.

Lacroix, J., Saini, P., and Goris, A., 2009. Understanding user cognitions to guide the tailoring of persuasive technology-based physical activity interventions. *4th international conference on persuasive technology*, 350.

Lapouchnian, A., 2005. Goal-oriented requirements engineering: An overview of the current research. *University of Toronto*, 32.

Latané, B., Williams, K., and Harkins, S., 1979. Many hands make light the work: The causes and consequences of social loafing. *Journal of Personality and Social Psychology*, 37 (6), 822–832.

Lazar, J., Feng, J. H., and Hochheiser, H., 2017. *Research Methods in Human-Computer Interaction*. Research Methods in Human Computer Interaction. Morgan Kaufmann Publishers Inc.

Lister, C., West, J. H., Cannon, B., Sax, T., and Brodegard, D.,2014. Just a fad? gamification in health and fitness apps. *JMIR serious games*, 2:e9.

Linda Westfall, 2011. Software Risk Management, I*nternational Conference on Software Quality*, San Diego, California, February 8-10.

Liu, Y., Alexandrova, T., and Nakajima, T., 2011. Gamifying intelligent environments. *In*:. Presented at the the 2011 international ACM workshop, New York, USA: ACM Press, 7.

Locke, E. A., 1982. Relation of goal level to performance with a short work period and multiple goal levels. *Journal of Applied Psychology*, 67 (4), 512–514.

Locke, E. A. and Latham, G. P., 2002. Building a practically useful theory of goal setting and task motivation: A 35-year odyssey. *American Psychologist*, 57 (9), 705–717.

Locke, E. A., Latham, G. P., and Erez, M., 1988. The Determinants of Goal Commitment. *The Academy of Management Review*, 13 (1), 23–39.

Lubbe, S., 2003. The development of a case study methodology in the information technology (IT) field - a step by step approach. *ACM International Conference Proceeding Series*, New York, USA.

Magerkurth, C., Cheok, A. D., Mandryk, R. L., and Nilsen, T., 2005. Pervasive games - bringing computer entertainment back to the real world. *Computers in Entertainment*, 3 (3), 4, ACM.

Marczewski, A. C., 2015. *Even Ninja Monkeys Like to Play*. London: Blurb Inc.

Marache-Francisco, C. and Brangier, E., 2013. Perception of gamification: Between graphical design and persuasive design. *In International Conference of Design, User Experience, and Usability.*558-567. Springer, Berlin, Heidelberg.

McGillicuddy, N. B., Pruitt, D. G., and Syna, H., 1984. Perceptions of Firmness and Strength in Negotiation. *Personality and Social Psychology Bulletin*, 10 (3), 402–409.

Michael, D.R. and Chen, S.L., 2005. *Serious games: Games that educate, train, and inform*. Muska & Lipman/Premier-Trade. Boston: Thomson Course Technology PTR.

Miner, J. B., 2015. *Organizational behavior 4: From theory to practice*. New York: McGraw-Hill/Irwin. Routledge.

Molden, D. C. and Finkel, E. J., 2010. Motivations for promotion and prevention and the role of trust and commitment in interpersonal forgiveness. *Journal of Experimental Social Psychology*, 46 (2), 255–268.

Mollick, E. R. and Rothbard, N., 2013. Mandatory Fun: Gamification and the Impact of Games at Work. *SSRN Electronic Journal*, The Wharton School Research Paper Serie.

Monk, A., Davenport, L., Haber, J. and Wright, P., 1993. *Improving your human-computer interface: A practical technique* (Vol. 1). New York: Prentice Hall.

Mora, A., Riera, D., Gonzalez, C., and Arnedo-Moreno, J., 2015. A Literature Review of Gamification Design Frameworks. *In:. Presented at the VS-Games 2015 - 7th International Conference on Games and Virtual Worlds for Serious Applications,* IEEE, 1–8.

Morris, M. G. and Venkatesh, V., 2000. Age differences in technology adoption decisions: Implications for a changing work force. *Personnel Psychology*, 53 (2), 375–402.

Morris, T. and Wood, S., 2016. Testing the Survey Method: Continuity and Change in British Industrial Relations. *Work, Employment and Society*, 5 (2), 259–282.

Morschheuser, B., Hassan, L., Werder, K., and Hamari, J., 2018. How to design gamification? A method for engineering gamified software. *Information and Software Technology*. 95, 219-237.

Muehlen, Zur, M. and Rosemann, M., 2005. Integrating risks in business process models. *In:. Presented at the ACIS 2005 Proceedings - 16th Australasian Conference on Information Systems*.

McLeod, S., 2007. Maslow's hierarchy of needs. *Simply psychology*, 1. Retrieved from https://www.simplypsychology.org/maslow.html.

Mumford, E., 1993. The ETHICS approach. *Communications of the ACM*, 36 (6), 82.

Myers, M. D., 2009. *Qualitative Research in Business & Management*. Tousand Oaks California: Sage Publication Limited.

Nicholson, S., 2012. A user-centered theoretical framework for meaningful gamification. *Games+ Learning+ Society,*8.

Nixon, H., 1998. *Fun and Games are serious business in J.* Sefton-Green (ed.). Digital Diversions: Yout's Culture in the Age of Multimedia. London: UCL Press.

Norman, D. A. and Draper, S. W., 1986. *User Centered System Design; New Perspectives on Human-Computer Interaction*.L. Inc., Hillsdale, NJ, USA.

Nuseibeh, B. and Easterbrook, S., 2000. Requirements engineering. *In:. Presented at the conference*, New York: ACM Press, 35–46.

O'Donovan, S., Gain, J., and Marais, P., 2013. A case study in the gamification of a university-level games development course. *In:. Presented at the South African Institute for Computer Scientists and Information Technologists Conference*, New York: ACM Press, 242–10.

Oinas-Kukkonen, H. and Harjumaa, M., 2009. Persuasive Systems Design - Key Issues, Process Model, and System Features. *CAIS*, 24 (1), 485–500.

Okoli, C. and Pawlowski, S. D., 2004. The Delphi method as a research tool: an example, design considerations and applications. *Information & Management*, 42 (1), 15–29.

Orji, R., Tondello, G. F., and Nacke, L. E., 2018. Personalizing Persuasive Strategies in Gameful Systems to Gamification User Types. *In:. Presented at the 2018 CHI Conference*, New York: ACM Press, 1–14.

O'Meara, K., 2011. Inside the Panopticon: Studying Academic Reward Systems. *In*: *Higher Education: Handbook of Theory and Research*. Dordrecht: Springer, Dordrecht, 161–220.

Pardee, R. L.,1990. Motivation theories of maslow, herzberg, mcgregor & mc- clelland. a literature review of selected theories dealing with job satisfaction and motivation. *Educational Resources Information Center* (ERIC).24. Downloaded from http://files.eric.ed.gov/fulltext/ED316767.pdf

Passos, E. B., Medeiros, D. B., Neto, P. A. S., and Clua, E. W. G., 2019. Turning Real-World Software Development into a Game. *In:. Presented at the 2011 Brazilian Symposium on Games and Digital Entertainment (SBGAMES)*, IEEE, 260–269.

Pedreira, O., García, F., Brisaboa, N., and Piattini, M., 2015. Gamification in software engineering – A systematic mapping. *Information and Software Technology*, 57, 157–168.

Penner, L. A., Dovidio, J. F., Piliavin, J. A., and Schroeder, D. A., 2005. Prosocial Behavior: Multilevel Perspectives. *Annual Review of Psychology*, 56 (1), 365–392.

Perry, D. E., Siy, H. P., and Votta, L. G., 2001. Parallel changes in large-scale software development: an observational case study. *ACM Transactions on Software Engineering and Methodology*, 10 (3), 308–337.

Perry, J. G. and HAYES, R. W., 1985. RISK AND ITS MANAGEMENT IN CONSTRUCTION PROJECTS. *Proceedings of the Institution of Civil Engineers*, 78 (3), 499–521.

Phillips, D. C.,1987. *Philosophy, science and social inquiry: Contemporary methodological controversies in social science and related applied fields of research*. Oxford, UK: Pergamon Press.

Pløhn, T. and Aalberg, T. 2015., Using Gamification to Motivate Smoking Cessation.*In European Conference on Games Based Learnin*g, Page 431.

Raftopoulos, M., 2014. Towards gamification transparency: A conceptual framework for the development of responsible gamified enterprise systems. *Journal of Gaming & Virtual Worlds*, 6 (2), 159–178.

Raftopoulos, M., 2016. How organisations play: creating stakeholder value with enterprise gamification, RMIT Research Bank https://researchbank.rmit.edu.au/view/rmit:161749

Raftopoulos, M., Walz, S. and Greuter, S., 2015. How enterprises play: Towards a taxonomy for enterprise gamification. *In Conference: Diversity of Play: Games–Cultures-Identities*. DiGRA. Recuperado de https://goo. gl/3PD4f9.

Robson, K., Plangger, K., Kietzmann, J. H., McCarthy, I., and Pitt, L., 2016. Game on: Engaging customers and employees through gamification. *Business Horizons*, 59 (1), 29–36.

Robson, C., 2002, *Real World Research* (2nd edn). Oxford: Blackwell.

Rolland, C., Souveyet, C., and Achour, C. B., 1998. Guiding goal modeling using scenarios. *IEEE Transactions on Software Engineering*, 24 (12), 1055–1071.

Ryan, R. M. and Deci, E. L., 2000a. Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions. *Contemporary Educational Psychology*, 25 (1), 54–67.

Ryan, R. M. and Deci, E. L., 2000b. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55 (1), 68–78.

Ryan, R. M., Rigby, C. S., and Przybylski, A., 2006. The Motivational Pull of Video Games: A Self-Determination Theory Approach. *Motivation and Emotion*, 30 (4), 344–360.

Sampaio Do Prado Leite, J. C., Hadad, G. D. S., Doorn, J. H., and Kaplan, G. N., 2000. A scenario construction process. Requirements engineering, 5 (1), 38–61.

Sanchez-Gordón, M.L., Colomo-Palacios, R. and Herranz, E., 2016, September. Gamification and human factors in quality management systems: mapping from octalysis framework to ISO 10018. *In European Conference on Software Process Improvement* (pp. 234-241). Springer, Cham.

Sanders, E., 2002. From user-centered to participatory design approaches. In J. Frascara (Ed.), *Design and the Social Sciences Making connections* (pp. 1–8). London: Taylor & Francis.

Saunders, M., Lewis, P., and Thornhill, A., 2009. *Research Methods for Business Students*. Pearson Education. Edinburgh, England: Pearson Education Limited.

Schmidt, R., Lyytinen, K., Keil, M., and Cule, P., 2001. Identifying Software Project Risks: An International Delphi Study. *Journal of Management Information Systems*, 17 (4), 5–36.

Shahri, A., Hosseini, M., Almaliki, M., Phalp, K., Taylor, J., and Ali, R., 2016. Engineering software-based motivation - A persona-based approach. *RCIS*, 2016-August, 1–12.

Shahri, A., Hosseini, M., Phalp, K., Taylor, J., and Ali, R., 2014. Towards a Code of Ethics for Gamification at Enterprise. *PoEM*, 197, 235–245.

Shahri, A., Hosseini, M., Phalp, K., Taylor, J., and Ali, R., 2016. Exploring and Conceptualising Software-Based Motivation Within Enterprise. *PoEM*, 267 (Chapter 17), 241–256.

Shahri, A., Hosseini, M., Phalp, K., Taylor, J. and Ali, R., 2019. How to engineer Gamification: the consensus, the best practice and the grey areas. *Journal of Organizational and End User Computing (JOEUC)*, 31(1), 39-60.

Shahri, A., Hosseini, M., Taylor, J., Stefanidis, A., Phalp, K., and Ali, R., 2019. Engineering digital motivation in businesses: a modelling and analysis framework. *Requirements engineering*, 7 (1), 1-32.

Sharp, Rogers, Preece, 2008. *Interaction Design: Beyond Human-Computer Interaction, 2Nd Ed*. New York: John Wiley & Sons.

Shipley, D. D., Sales, J. K. J. O. P. S., 1986, n.d. Industrial salesforce motivation and Herzberg's dual factor theory: A UK perspective. *Taylor & Francis Journal of Personal Selling & Sales Man- agement*, 6(1):9–16.

Simões, J., Redondo, R. D., and Vilas, A. F., 2013. A social gamification framework for a K-6 learning platform. *Computers in Human Behavior*, 29 (2), 345–353.

Simpson, P. and Jenkins, P., 2015. Gamification and Human Resources: an overview. Business Solution : Better Training through Gaming. *The Wall Street Journal*. Brighton: Brighton Business School.

Smith, R., 2011. The future of work is play: Global shifts suggest rise in productivity games. *In*:. *Presented at the 2011 IEEE International Games Innovation Conference* (IGIC), Piscataway,USA: IEEE, 40–43.

Spinuzzi, C., 2005. The Methodology of Participatory Design. *Technical Communication*, 52 (2),163–174

Stemler, S., 2001. An overview of content analysis. *Practical Assessment, Research and Evaluation*, 7 (17), 137-146.

Sternberg, R. J., 1999. *Handbook of Creativity*. New York:Cambridge University Press.

Stirna, J., Zdravkovic, J., Grabis, J., and Sandkuhl, K., 2017. Development of Capability Driven Development Methodology - Experiences and Recommendations. *PoEM*, 305 (1), 251–266.

Strauss, A. and Corbin, J., 1990. *Basics of qualitative research*. Newbury Park: Sage Publication.

Strauss, A. and Corbin, J. M., 1997. *Grounded theory in practice.* Thousand Oaks, CA: Sage Publication.

Strauss, A. and Corbin, J., 1994. *Grounded theory methodology*. Handbook of qualitative research, 17,273-85.

Suebkuna, B. and Ramingwong, S., 2019. Towards a complete project oriented risk management model: A refinement of PRORISK. *In*:. *Presented at the 2011 International Joint Conference on Computer Science and Software Engineering* (JCSSE), IEEE, 349–354.

Suriadi, S., Weiß, B., Winkelmann, A., Hofstede, ter, A. H. M., Adams, M., Conforti, R., Fidge, C., La Rosa, M., Ouyang, C., Pika, A., Rosemann, M., and Wynn, M., 2014. Current research in risk-aware business process management-overview, comparison, and gap analysis. *CAIS*, 34 (1), 933–984.

Susi, T., Johannesson, M., and Backlund, P., 2007. Serious Games : An Overview. *Elearning,* 73(10),28.http://doi.org/10.1.1.105.7828.

Sutcliffe, A., 1997. A technique combination approach to requirements engineering. *In*:. Presented at the ISRE '97: *3rd IEEE International Symposium on Requirements Engineering*, 65–74. IEEE

Sutcliffe, A. G. and Carroll, J. M., 1998. Generalizing Claims and Reuse of HCI Knowledge. *BCS HCI Conference*.159-176, Berlin: Springer.

Thiebes, S., Lins, S., and Basten, D., 2014. Gamifying Information Systems - a synthesis of Gamification mechanics and Dynamics. ECIS. I*n Twenty-Second European Conference on Information Systems* (pp. 1–17). TelAviv.

Thomas, J. R., Nelson, J. K., and Silverman, S. J., 2015. *Research Methods in Physical Activity. Human Kinetics*. Champaign, IL: Human Kinetics.

Thorpe, A.S. and Roper, S., 2019. The ethics of gamification in a marketing context. *Journal of business ethics*, 155(2), 597-609.

Timmer, J., Kool, L., and van Est, R., 2015. Ethical Challenges in Emerging Applications of Persuasive Technology. *Persuasive Technology*. (eds. MacTavish, T. & Basapur, S.),Springer International. 196–201

Tondello, G. F., Orji, R., and Nacke, L. E., 2017. Recommender Systems for Personalized Gamification. *In:. Presented at the Adjunct Publication of the 25th Conference,* New York, USA: ACM Press, 425–430.

Tuckman, B. W. and Jensen, M. A. C., 1977. Stages of Small-Group Development Revisited. *Group & Organization Management*, 2 (4), 419–427.

Uskov, A. and Sekar, B., 2019. Serious games, gamification and game engines to support framework activities in engineering: Case studies, analysis, classifications and outcomes. *In:. Presented at the 2014 IEEE International Conference on Electro/Information Technology* (EIT), IEEE, 618–623.

Vaismoradi, M., Turunen, H., and Bondas, T., 2013. Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nursing & Health Sciences*, 15 (3), 398–405.

Van Eck, R., 2006. Digital game-based learning: It's not just the digital natives who are restless. *EDUCAUSE review*, 41(2),16.

Versteeg, M. J. J. M., 2013. *Ethics & Gamification design: a moral framework for taking responsibility.*(Master thesis), Universiteit Utrecht, Utrecht, The Netherlands.

Vilpola, I., Ojala, M., and Kouri, I., 2006. Risks and Risk Management in ERP Project - Cases in SME Context. *BIS*, 179–186.

Viswesvaran, C. and Ones, D. S., 2000. Perspectives on Models of Job Performance. *International Journal of Selection and Assessment*, 8 (4), 216–226.

Wallmüller, E., 2002. Risk Management for IT and Software Projects. *In*: *Business Continuity*. Berlin, Heidelberg: Springer, Berlin, Heidelberg, 165–178.

Wang, H. and Sun, C.-T., 2011. Game reward systems - Gaming experiences and social meanings. In *DiGRA Conference: Think Design,* 1-12.

Webb, E. N. E., 2013. Gamification: When It Works, When It Doesn't. Design, User Experience, and Usability. Health, Learning, Playing, Cultural, and Cross-Cultural User Experience. *Springer Berlin Heidelberg*, 608–614.

Williams, D., Consalvo, M., Caplan, S., and Yee, N., 2009. Looking for Gender: Gender Roles and Behaviors Among Online Gamers. *Journal of Communication*, 59 (4), 700–725.

Williams, T., 1995. A classified bibliography of recent research relating to project risk management. *European Journal of Operational Research*, 85 (1), 18–38.

Wilson, J., 2014. *Essentials of Business Research*: *A guide to Doing Your Research Project*, London: Sage.

Xu, F., Buhalis, D., and Weber, J., 2017. Serious games and the gamification of tourism. *Tourism Management*, 60, 244–256.

Xu, Y., 2011. Literature Review on Web Application Gamification and Analytics, Honolulu,HI,.[Online].Available:https://csdltechreports.googlecode.com/svn/trunk/techrepo rts/2011/11-05/11-05.pdf. CSDL Technical Report 11-05, University of Hawaii, USA.

Yu, E., 1997. Towards modelling and reasoning support for early-phase requirements engineering. *In: Proceedings of the third IEEE international symposium on requirements engineering*, 1997. IEEE, 226–235.

Yu, L.L.E., 2001. From requirements to architectural design–using goals and scenarios. *db.toronto.edu. In First International Workshop From Software Requirements to* Architectures-STRAW .Toronto, Canada.22-30.

Yu, E. and Mylopoulos, J., 1998, June. Why goal-oriented requirements engineering. *In Proceedings of the 4th International Workshop on Requirements Engineering*: *Foundations of Software Quality.*15,15-22.

Zichermann, G. and Cunningham, C., 2011. *Gamification by Design - Implementing Game Mechanics in Web and Mobile Apps.*1st ed., Cambridge MA: O'Reilly Media Inc.

Zoet, M., Welke, R., Versendaal, J., and Ravesteyn, P., 2009. Aligning Risk Management and Compliance Considerations with Business Process Development. *E-Commerce and Web Technologies*, LNCS 5692, Springer, Berlin (Chapter 16), 157–168.

Zuckerman, O. and Gal-Oz, A., 2014. Deconstructing gamification: evaluating the effectiveness of continuous measurement, virtual rewards, and social comparison for promoting physical activity. *Personal and Ubiquitous Computing*, 18 (7), 1705–1719.

11. APPENDICES

11.1 APPENDIX 1

The study materials used for the research study proposed in Chapter **4**

Part1

Information Sheet
The title of the research project
Designing Gamification for Workplaces

Invitation

You are being invited to take part in this research project conducted by Abdullah Algashami, a research student in the Department of Computing and Informatics, Faculty of Science & Technology, Bournemouth University, UK. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. You will be asked to sign a participant agreement form and at the end of the session you will be given a copy of this information sheet and a copy of the signed participant agreement form.

What is the purpose of the project?

The aim of this research is to study how to engineer gamification systems for a workplace in a way which could help to increase its efficiency and minimise side-effects. A common technique is where a game element are added to the online system and users' performance is reflected in a form of badges, points, leader boards, status, progress bar, timer, etc. I aim by conducting this study to explore the main risk factors which might affect the system and introduce risk to the work environment and sketch them with mitigation strategies to minimise the effect of such risks.

Why have I been chosen?

You have been chosen because of your background and expertise and reputation in the research, development and practice of gamification and its related area. The research team believe your feedback will be beneficial to consolidate the approach and mechanisms proposed in this project.

Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a participant agreement form. You can withdraw at any time, up to the point where the data are processed and become anonymous, so your identity cannot be determined, without it affecting any benefits that you are entitled to in any way. You do not have to give a reason. Deciding to take part or not will not adversely affect you.

What would taking part involve?

As a participant in this project, there will be some activities to undertake. Firstly, you will fill a short pre-selection survey to gather your demographic data and your experience with gamification elements. If based on the information you provide you are selected for the next stage of the project, you will be asked to take part of an interview

or a focus group. This could be done in person or by audio or videoconference depending on your preferences, location and availability. In the next stage (the researcher) will ask to get permissions to observe your group's work and interactions with the gamification system. This is to help me understanding how the transparency elements might have affect in the acceptance and validity of the gamification system.

What are the advantages and possible disadvantages or risks of taking part?

Whilst there are no immediate benefits for those people participating in the project, it is hoped that this work will improve our understanding of the usage of gamification in workplace and how we improve the design that can help to maximise the acceptance of such technology and minimise side-effects.

How will my information be kept?

All the information that I collect during the course of the research will be kept strictly confidential. You will not be able to be identified in any reports or publications. All data relating to this study will be kept for 5 years on a BU password protected secure network.

Will I be recorded, and how will the recorded media be used?

Yes. The recording will help the research team to capture the information that will be sought from you during the interview or the focus group. However, you will be given the right to accept or reject the recording. No other use will be made of the recording without your written permission, and no one outside the research team will be allowed access to the original recordings. The audio recordings made during this research will be deleted once transcribed and anonymised. The transcription of the interviews will not include your name or any identifiable information. Instead, each person will be identified by their code (i.e. #id523741, #id523753, etc.).

Contact for further information

If you have any queries about this research please contact Abdullah Algashami by email on aalgashami@bournmeouth.ac.uk or by phone on 01202 961217 or by post to:
Abdullah ALgashami
Department of Computing & Informatics
Faculty of Science and Technology
Bournemouth University
BH12 5BB

Complaints

If you have any complaints about this project please contact Professor Tiantian Zhang, Deputy Dean for Research and Professional Practice of the Faculty of Science and Technology at Bournemouth University at the following address:
Professor Tiantian Zhang
Talbot Campus, Fern Barrow, Poole, BH12 5BB
E-mail: researchgovernance@bournemouth.ac.uk
Tel: 01202 965721

Thank you for taking the time to read this information sheet, and please do not hesitate to contact me if you have any queries.

Part 2: Interviews: Participants Demography

Study title:

===

Participant Name:

Participants Signature:

Your gender:

Age group:

Current work:

Any previous business work:

Years of experience with gamification techniques:

Gamification element if any specific:

Best Wishes,

Abdullah

Participant Agreement Form: (Observation study)
Full title of project: Designing Gamification for Workplace

Name, position and contact details of researcher:
Abdullah Algashami, PhD student, Bournemouth University
Email: aalgashami@bournemouth.ac.uk

	Please Initial or Tick Here
I have read and understood the participant information sheet for the above research study	
I confirm that I have had the opportunity to ask questions.	
I understand that my participation is voluntary.	
I understand that I am free to withdraw up to the point where the data are processed and become anonymous, so my identity cannot be determined	
I am free to ask the researcher to leave the workplace at any time without there being any negative consequences.	
I agree to take part in the above research project.	

_____   _____
_____
Initials of Participant   Date   Signature

_____   _____
_____
Initials of Researcher   Date   Signature

Part 4: **Advertising the Study**

Who we are and what we work on

We are a research team at Bournemouth University, part of the Engineering of Social Informatics Research Group (ESOTICS).

Gamification is the use of some form of game elements in a business context, e.g. points, leader boards, badges, avatars, progress bars, timers, levels, etc.

We noted Gamification solutions could cause unwanted side-effects such as stress, feeling of unfairness and, consequently, reduce the quality of job.

We have developed strategies and ways to detect these risks and reduce them and we would like your help in discussing them.

Researcher? Analyst?
Designer?
Developer?
Data analytics Expert?
Marketing?
Manager?
Where Gamification is developed or adopted
We need You

WHO?

We are looking for **researchers, managers, analysts, designers, developers, HR** and **data analytics personnel** who research, adopt and/or develop Gamification solutions in this institutions.

WHAT?

We would like to invite you to an online **interview**,

Interviews are expected to take around **~40min** of which 10 min will be dedicated to introduce the topic and research background

A £15 gift voucher will be offered to each participant as appreciation

We are looking for your personal view which may not be necessarily the company views.

If you agree to take part, please email **the research team:**

Abdullah Algashami
aalgashami@bournemouth.ac.uk
Dr Laura Renshaw-Vuillier
lrenshawvuillier@bournemouth.ac.uk
Dr Raian Ali rali@bournemouth.ac.uk

You will be sent a consent form and participant information sheet to read and sign if you are happy with it.

We highly appreciate your contribution to our research which is non-commercial and purely meant to contribute to the body of knowledge in this area.

To know more about our group and the research we do, please visit our Webpage or follow us on Twitter:

Twitter: @bu_esotics
Web: www.bournemouth.ac.uk/esotics

Part 5: Example of the Coding manual for analysing the interview questions

Example Theme Table

Theme	Sub-theme	Description	Quotes
Risk as part of people performance in a task	Transparency in their performance	Participants describe transparency of their performance can affect their teamwork	"I really like the feedback related to my personal performance to be hidden from others (transparency on the result) and I have the ability to share it with others this will make us more coherence I think and deal with each other in better way"(T1)
Risk as part of people performance in a task	Depending on others to perform a task	Participant describe some conflict happen with their performance depending on others	"In some task I need to work with other to complete the work and this can have effect on my performance you know I need them to work hard to be able to win the reward and if they not this will affect my chance to win"(T1) "I can say I only one time had experienced people not help as they should and I felt they do not want me to finish the task in less time"(HZ)
Risk as part of people performance in a task	Receiving performance feedback	Receiving performance feedback from supervisor or manager in teamwork has a negative effect on teams	"Let say most of the comments people discuss with me is the result of the system or of the feedback they received " (YD) Supervisor "I have noticed some colleagues cannot work for some time after receiving the supervisor feedback regarding our performance and be less motivated at that time" (HZ)
Risk as part of people performance in a task	Collective performance can introduce risk to the teamwork	Participant describe that rewards and feedback on the collective performance of staff, might have a negative influence on the level and quality of collaboration among them	"I cannot win the highest reward which is in team comparison because we collectively should work in the same ambitious to win otherwise will could not. So what this mean, my personal performance or contribution would not help me to win without others to be in the same progress"(MA) "I understand that it is difficult when the task is collectively performed but this should also think about not make the user feel more pressure to finish with others or to be compared with others all the time"(SR)
Risk as apart of Monitoring technique in the gamification element	Participant describe their feeling of over control in such system	Descriptions of risk or conflict related to the supervisor or the system monitoring their performance and giving them certain way to perform task	"Yes I sometimes feel that the system control or work and sometimes the way to manage the task like giving us time to finish certain number of calls so this affect me and make me feel a bit of forcemeat to do the task rather than motivated to finish it"(SR) "It is a good idea to be motivated in such system but it must be manage to not have anything which might

			affect our feeling or make us work like machines with each other's without emotions or help"(FM) "I know that staff fined it a kind of over controlling them, but the main purpose of that is to make them aware of their performance and to do their best to increase it"(MD) supervisor
Risk as apart of Monitoring technique in the gamification system	Participant describe the monitoring risk might introduce to their well-being	Description of risk as a result of extra work because of the monitoring feature in the system	"Of course we noticed some problem like working during their break time and keep working most of the time and does not build relation with others or not helping others in the department as a result of such monitoring technique"(RN) manager "the problem is the system monitors us during our work this sometimes can affect me and increase the stress on me" (NR) "I really find it a source of pressure I never win or appear in the system and this make everyone knows that about me and they does not prefer to be with me in the same team"(FM)
Risk as apart of Monitoring technique in the gamification system	Accessibility of information	Description of risk as a result of accessing staff information via the manager, supervisor or other staff	"I had a discussion from some of the staff asking me to send the feedback personally without any access from their friend but this is not the case right now. We informed them that we will be accessing your calls and we will be monitoring your progress also they understand why we should do that and they can discuss any further issues related to that at any time"(MD) supervisor "Another element which I can think of is the when they access our work and what sort of things they are looking for I really prefer to know the accessibility time and the sort of information that has been collected. Is it only by the manager or also the supervisor can see everything and what about the other supervisors are they able to see my progress or my information these sort of things are really important" (HZ)

Part 6: **Example of the Initial template of Risk and risk factors from the previous studies before starting the observation study**

<table>
<tr><td colspan="1">

Initial Template

Examples of Factors of risks

- Competition for limited resources (applying psychology)
- Differences in goals and objectives (same)
- Unclear goals (causing risks in monitoring of the quality of the group work)
- Personal differences and culture differences (same) : Age: different generation accept different values of
- Type of task there are three types of tasks (independence, cooperation, competition this explain the chance of
- Reward (Type of reward, Strategy)
- Reward may demotivate users when it's not related to their personal goals
- People authorization
- Level of goals (high and difficult goals)
- Transparency (performance, auditing results, reward)
- Anonymity (reviewer, name, goals)
- Leaking of (personal data, performance, achievements)
- Conflict of interest
- Pressure in group members (new members will put more effort to win …)

Samples of potential Risks:

- Destroy value (force people , Leaking of data, Homogenisation of the group members)
- Sustainability of reward goals may lead to boring
- Homogenisation in group work.
- Human rights
- Negative reinforcement
- Environmental risks or issues
- Fake sense of achievement

</td></tr>
</table>

Part 7: **Sample of the notes taken during the observation study**

Example of Observation Notes

Description:

These notes cover observing the Call centre department teams' activities that run on Agency Company:
.
The sessions run in the 1st floor at a big room involving at least 50 people. The department has supervisors each supervisor responsible for at least 3 teams each team has 7 people. The department has one manager.
.
People in the room are setting in private small desk with screen and headphone.
.
People can walk around talk with each other at any time.
.
At the corner of the department a rest room where agents can spend their break times, eat drink tea or coffee chat with each other.
.
The important thing is the ability for the researcher to discuss with people in their real time and sea the impact of the motivation element in real time.
.
This allows the observer to observe their reactions, the effect of the gamification on agents and how the work environment looks like in the real time.
.
The observer identify that the supervisor is sitting in a room with transparent walls so he can observe the whole department.
.
Before starting the observational studies, the supervisor arranges a meeting with the observer to introduce the work flow, give real examples, and discuss the purpose of the study.
.
The supervisor also introduces the observer to the people in the department and the purpose of him being in the room. The environment were friendly people can talk loudly and make jokes eat their delivery food in front of others.
.
People in the department work in two shifts: first group work from 9AM-4PM second group start work from 4PM- 11PM.
.
People in the department have their freedoms to work or to stop and take break at any time, while they are asked to make their personal devices on available mood to receive calls at least for five hours a day.
.
The department has a number of screens fitted on the wall and can be seen from everyone in the room to be used as a leader-board which shows teams names in the department in order based on the number of calls answered.
.
The supervisor explains to me the gamification mechanics used in their department, they are using leaderboard shows teams names in the department and number of calls each team have solved also another screen involve all people in the department as one team in a competition with other teams from other branched in different regions.
.
They also are using a gamification element technique which is similar to the badges technique. This is mainly for the team members, at the end of the week the supervisor send an email to

people including what they have done during the week and the result of how many badges each one gain based on that.

.
He also explains to me the three type of reward they mostly used to motivate their workers: a normal reward (discount coupons for famous shopping centres, free services from their company, increase in their salary), letter send via email from the supervisor or the manager and can be seen via others in their team and sometimes in other teams, they have a board fitted at the entrance of the department and they allocate the winner photos and names.

Notes Taken and issues discussed:

I noticed that people prefer to choose desks which are away from the supervisor room and when I asked the supervisor he agreed and says, yes agents feel more private and like to set in desk which located a way from my room even if they are always doing their work and engage in the task but just to feel more private.

-
I noticed that the supervisor may talk loudly while he walks in the room and try to encourage people to work and win the competition also he may comment on the result shows on the leader-board.

-
I clearly can notice that some agents keep checking the leader-board after each time and discuss with his/her team mates.

-
Some agents may have their snacks while they are doing their work and do not go for their lunch break.

-
I noticed that agents know the names of agents who have won the reward frequently. Some times I hear some of them making jokes with them like saying (we never seen you in the lunch room and lough together…).

-
I notice that some agents who seems to be experts in the department others tend to come to their desks and discuss with them how the system is working and what they need to do to win etc… (I need to ask questions in the interview to explore further do people understand the purpose of the system exactly …).

-
The supervisor show me some real examples of the information included in the email send to the agents in his teams and also examples of agents reply if they have some issues regarding the result (I need to investigate further in the interviews about do the collective email send to them by the supervisor has negative said on them, do they know about how the result on this email being calculated and based on what the judgments…)

-
 I ask the supervisor; do you have any matrix you divide people in teams based on? He said, no we do not have but we try to mix agents with different experiences, ages, genders etc.

-
I should ask in the interviews about do the agents have any concerns regarding what others can see about them in the leader-board?

I clearly can see how the system has influence on people and make them more concern about how they can be seen by others and by managers. I can identify people stand and talk with neighbours when the leader-board has new update and the point to the leaderboard while they are discussing so I may need to further explore what affect the system might has to their personal attitude in the team.

-
I am really shocked some agents does not know why the system are used and they do not have idea what is the main benefit of it?!!! (need to aske in the interviews).

-

I can see some agents stand and ask the one set next to them while they hold a customer call which means that some tasks require external resources to be implemented
 and dependence on others. I also can see them ask to send them the description of what they need via email as soon as they can.

-

While I am setting in the supervisor room where also (we can see people in the department) an agent come and ask the supervisor that people in his team (one or two I am not sure) in a bad mood today for personal issue and ask him if possible to add some one to the team only for this week !!!

-

The supervisor till me that they have some agents who never appear in the leaderboard and they clearly via reviewing their progress can see them always meet the requirements but without any motivation to improve their progress and compete to win the reward. (I need to explore more what are the elements which affect their motivation to win the competition).

-

During my lunch time I spent in the main restaurant in the company which located in the same floor. I asked the guy working there, what sort of food agents are prefer and do they normally eat here or take it out. He said that most of people take ready snack with them and not prefer food which need time to be prepared. (this is might be related to the affect the syetem might have in people in realtion to real time performance so I need to ask about that?

-

I can clearly identify the social impact of such system and the influence it has, as people while they are talking in their free time they mention the system and the order appear their and what they have gained last month, some of them clearly mention to me that I am worried about my picture in others eyes more than the reward itself. (Social influence).

-

Some people tell me that they really prefer to work in individual performance more than in collective, they emphasise that I am a hard worker and really motivated to compete others but I sometimes become negatively affected by other people in my team so I really find it hard to keep motivated in such situation (I may find out more about what collective task or performance affect in the people involved in the system)

-

The environment clearly seems to be a friendly environment, I can hear some jokes and I saw today one person invited others in a diner after finishing the work. So, adding a gamification element with a competitive nature might destroy the environment and has a negative effect on people (need more clarification in the interviews).

-

Today the manager told me that he had a discussion with a supervisor and the main discussion was about complain received from a staff to his supervisor about the personal information involved in the feedback sent to all people in the team which include number of working hours number of days off performance description e.g. number of calls answered customers rate of his call

-

One female told me she really does not prefer to be known as top worker or winner of the month and when I asked her why? She clearly says I really start to identify people cam to my desk spending time discussing with me this and how I made it and this really affecting my time.

-

it seems that people in the work place divided into two views, some of them prefer the ability to win the reward to be challenging in order to be motivated to perform a task while others find it prevention for them to engage in a task.

-

The supervisor told me that we try to improve our rewarding system because we still can see some people are not motivated enough with some kind of rewards also some of them become motivated in first or second one and then they are not more willing to win or to compete with others to win.

Examples of the interviews questions and sample of sensible answers:

Interview Questions

Participant name or initial: Interview Date:

■   ■ Reason for a risk   ■ Risk example

==

Q1: What sort of gamification element you had an experience with (e.g. Leader-board, badges, points, status, etc.) and for how long?

(FM) Agent: In our department they used a screen (leader-board) where we as group compared with other teams and our teams' names listed in the screen and also within the team they send us a badge to each one in the team based on his or her performance. I am working in this department for more than five years.

(FZ) Agent: I am new here just six months of experience. I am involved in a team and start the work from the first day I was not sure at the beginning about the system but I was really doing my best to show myself and to help my team to win. As far as I understand the screen [leaderboard] help us to increase our performance and appear in the top of the screen.

(PT) Supervisor: I am working here for more than ten years and become a supervisor two years ago. We use a leaderboard where all the teams in the department are competing to win a reward at the end of the month. We have another screen for the whole department where their performance compared with other branches of the company from other regions. I am also responsible to measure my teams' performance and then send them feedback related to their work.

The researcher: What kind of feedback do you usually send to them and how is their reaction to it?

The feedback sometimes to give them some comments, encourage them to increase performance or a reward to the best member in the team as (badge). I am still keep changing the feedback technique to improve it more and manage the side-effects like having members frustrated after the result or affecting their motivation to work more in the next month …

Q2: In general what sort of issues or challenges comes to your mind when you think of adding a gamification element within teamwork to increase performance and motivation?

(HZ) Agent: Well I found it a useful technique and make us work more to win a reward and help each other in the team to do better. But that is not enough the system should care about the differences in people because some of them might feel frustrated when they feel that others better than them and they never when the reward while others might keep trying and feel motivated to increase performance. So it's really depending on individuals' personality. I have

noticed some colleagues cannot work for some time after receiving the supervisor feedback regarding our performance and be less motivated at that time.

(T1) Agent: to be honest I really like the feedback related to my personal performance to be hidden from others (transparency on the result) and I have the ability to share it with others this will make us more coherence I think and deal with each other in better way. In some task I need to work with other to complete the work and this can have effect on my performance you know I need them to work hard to be able to win the reward and if they not this will affect my chance to win. (Dependence on others).

(MA) Agent: I will tell you something what we have now in our work. I cannot win the highest reward which is in team comparison because we collectively should work in the same ambitious to win otherwise will could not. So what this mean, my personal performance or contribution would not help me to win without others to be in the same progress. (This means when the performance need to be collective this has a chance of risk).

Q3: In relation to the primary feature of the system which is motivating staff to work more and engage in the task, from you experience how do you describe the negative or positive effect gamification elements like leader-board, badges can introduce to you, your team and the environment?

(NR) Agent: As you know we are here friends so the competition might have influence to our relation. For myself I do not want to be known as top performer because others start to come to my desk and keep asking help which will affect my work time and also make people dealing with me or being good to me only because of that. So because the leaderboard allow everyone in the department to see the result and know the top performer this might cause conflict and make people concern all the time about their progress. It is a kind of stress I know stress can help to work more but some stress does not, it is the other way around.

(KD) Agent: As we may saw in the department that the screens (leaderboard) are fitted everywhere and people discuss any change on it and they feel good with it and this because the screen shows the team name and we feel more excitement to discuss it more than when it is related to individuals names people may take it personally when they discuss it so we like it more than the badges send to our email because this one compare us individually.

Q4: According to self-determination theory, one of the main human psychology needs is the autonomy to increase their intrinsic motivation, what sort of affect the gamification elements might have to you or your team in relation to that?

(AM) Agent: Yes this is exactly what I need in such environment. Do you know that everyone can identify when I am in break or I did not do a good work because of bad mood this is a bit affecting me and make me feel annoying sometimes. Also, in the feedback received from our supervisor he sometimes mention something which make me feel they monitor me most of the time and can know everything including how I did with the customer during the call or how we as friends in the team manage our duties which means he has access to everything at any time.

The researcher, asked (MD) Supervisor to investigate the previous question more: As you have access to staff performance and monitor them during their work, I actually during the observation identify that they do not prefer the closest desks to your office so Do you think that these things might affect their autonomy and then affect their performance?

(MD) supervisor: I know that staff fined it a kind of over controlling them, but the main purpose of that is to make them aware of their performance and to do their best to increase it. Sometimes I had a discussion from some of the staff asking me to send the feedback personally without any access from their friend but this is not the case right now. We informed them that we will be accessing your calls and we will be monitoring your progress also they understand why we should do that and they can discuss any further issues related to that at any time.

The researcher carry this point to discuss it further with (RN) manager: As a manger from your experience how do you evaluate the effect such motivation element could have in staff autonomy?

(RN) Manager: we have identified that some people would not prefer such dynamic and feel that they are under our control. I asked the supervisors to try to make the relation with their employee more friendly and do not affected because of such observational element. Also, we may ask the staff every time to participate in a session to explain to them and make them aware of the use of such technique and how they can be beneficial form such system. We are continuing improve the work environment and make it healthier. Of course we noticed some problem like working during their break time and keep working most of the time and does not build relation with others or not helping others in the department as a result of such monitoring technique.

Q5: What kind of concerns do you think of regarding to being in a team and motivated with such elements? And what affect do you think the system might introduce to the team coherence?

(HZ) Agent: Yes, I sometimes feel that why I should work hard while my personal contribution does not acknowledge that much. So I such mechanism we find some difficulties as we need to discuss in group our individual effort in a task which sometimes could cause negative reaction or tension from people and make us aware of such discussion. Another thing is sometime we find that the some people do not provide help like before because of the competition and they want to increase their chance to win.(external resources)

Researcher: what about the other groups do you think the competition might affect the collaboration level?

(HZ) Agent: to be honest it is really really depend on people personality. I know the system encourage people to win, but this should not affect the collaboration because the main reason for the system is to increase people performance but some staff only think of the reward (**the goal of the system and staff personal goal**) without any care of others and the work environment. I can say I only one time had experienced people not help as they should and I felt they do not

want me to finish the task in less time. The need for others to finish a task is quiet dangerous within such system.

Q6: **In relation to the result shown in the gamification element and the rewards, I have identified people in the department start to talk and behave differently in that time, how do you describe such effect to you, to people in your team or other people in the department?**

(BB) Agent*:* I am new here let say around one year I think the effect of the system was more when I started at early time of my work. Yes this is correct and you can easily identify it on new people more than old people **Researcher:** What you mean? (BB): I meant the new people discuss the reward and the result more than the old one. Also, in the group, the new participant make the rest of the group afraid of them. Yes the old ones have more experience but the new people take it more serious and work harder to show themselves.

(YD) Supervisor: Let say most of the comments people discuss with me is the result of the system or of the feedback they received, some of them asking about judgments made based on their performance I remember an agent discuss what time my performance is measured I have had some difficult times during the month so maybe the decision made at these times. So, yes the reward make people behave differently some of them feel motivated and increase their effort however, others just do the minimum effort they believe the reward is difficult to be achieved and they know some staff who most of the time win so they feel the chance to win is low and they only finish their main duties. The problem those kinds of people might have negative affect on others especially in team task or goals which sometimes affect the team work.

(NR) Agent: the problem is the system monitors us during our work this sometimes can affect me and increase the stress on me also judgment based on real time observation of our performance might be affected by reasons like difficult customer or issue which could increase the possibility of bias.

Q7: **From you point of view, what are the main elements in the system e.g. in relation to performing a task, achieving goal or wining a reward, that might have negative impact to you performance in your daily work?**

(AM) Agent: I think I feel good in my work when my effort is for myself only and do not need to be with others in the same time. I really like to answer calls and finish without need any help from my friends. This makes me feel more privacy and does not need to work under others pressure. I really like the system and I can see how my work increased but I do not to be compared with others al the time or I do not like to work with others in order to win the reward because as I said this can be affected by if they have no interest and does not spend enough effort on the task.

This appendix will provide the study materials used for the research methods presented in Chapter **5**.

Part1: **Interviews (Sample of one interview transcript)**

Me: Thank you very much. First of all, I've sent you an information sheet which describes why I am interviewing you, as a policy, to know the purpose of the interview and why you have been chosen and this sort of things.

En: Yes. I have the time to read it and it's fine with me and I also had the time to sign the consent form but I didn't have time yet to send it to you.

Me: First of all, I would like to thank you for accepting my request to interview regarding my study. Another thing is I'll try to not take your time and finish as early as I could.

En: That's fine.

Me: Explaining my work and the purpose of this interview. Then ask him about his experience of working with groups?

En: Yes. So in my professional experience here in my current work, I have had the chance to work in several groups and in many different environments. First, but most of the time I would say that the group was made it was most of the time would do this in disciplinary groups, so we can count with the people from our own company but also with people from the client and probably other stakeholders. Within the group of people working for us, such motivational panels are not usually used in my company. While we used the official tools so to say for motivation, to follow up and for showing the people, staff how they are doing in the process. First would be we use internal tools for tasks tracking like *Chennai, Gara* and then you consider how long the task will take and then you show how much time you have spent so far in the task, and so you have several dashboards showing how is the progress doing.

And then and how much will it take for according to plan so the team leader can have a general overview of how the progress is doing according to the remaining tasks. We use other panels to show the progress for the team - internal team that is we use Agile methodology for software development. And one of the tools used in this kind of methodology is the *Kanban 4* where we design which are the tasks taking place during the next period or sprint - like we call it, that it shouldn't take longer than 1 month.

We have our tasks and schedule to be developed during the next sprint and in a visual panel we have all the team looking at what are the learning tasks? How are we doing? Which are the tasks in progress? And each task should be assigned to a single person, and which ones we have completed so far. Usually these kind of things what they do is, we will have a daily meeting not longer than 15 minutes or so, where we show as a group where we are right now, what is remaining. But we usually do it as a group. It's not like individual there is no panel of who has completed more tasks or how many counting things on that. Not individual encouragement of a single person.

There is a task it depends on the maturity. It is not a corporate methodology but it is encouraged through the different production teams of the company to use this kind of methodologies. And then things that are mature enough to using this methodology, that methodology for a long time, they can modify or adapt it to their needs. Because depending on the client or the project, you should adapt it. There is one particular point in this methodology that helps building team, but as I mentioned the group using this specific item should be a very mature group. And I would has been already working to it for a long time and I use the working progress limitation.

The Kanban has columns, for example, these are the tasks that are scheduled for the next sprints. These are the ones that are scheduled for this sprint that have not yet been started yet. These are the ones in progress, these are the ones done, or that have been tested or pending for

testing. There is one specific theory that is inside agile methodology, that is *Scrum.* And *Scrum* says that there should be a limitation of task per column depending on the comment how big the group is, and this limitation increases or decreases. But the thing is that if there are too many tasks open and a new one is ready to enter this column, instead of a person in getting this new task, he should be helping others in emptying the column of tasks in order for other tasks to come in. It's collaborative.

I have finished and I'm helping other people in progressing to empty the current in progress task, to push them to the next column so we as a group can hurry up in getting new tasks. As I mentioned, right now in my company, this part of the agile methodology is not official methodology or obliged methodology, but it depends on the team leader or the project leader that wants to adapt these methodologies.

From an internal point of view, we are given many tools and courses and so on, encouraging us to adapt them but it's not like obliged or official. This methodologies in my experience they help - they're helping in team building and because everybody has a general view on how we are doing so far, and has a feeling that they are not alone. Everybody knows what they are doing and in early morning meetings, they can share if they have a particular problem. They can share it with the communities.

From an individual point of view, I was before having this interview, I was thinking of what kind of individual monitoring or regards we make at the company. What we do is that we usually when a person we have deeply with the use of our current position. We establish at the beginning of the year, we tell our objectives and we reach them. We have a specific reward, so to say, and whenever a person passes to another category, then we have an official email every year that this persons has passed to the next category, but it's not something that we do at the project level but it's more done at the office or at the company level.

Me: That's great. So you use many type of motivation element.

En: Yes, but motivation. The thing is that there's no fixed methodology, but the ones we are looking now that they work and we try to do is this type of agile methodology, more in the software development area. We try to measure through different task tracking tools and measure the progress, but also we need to make it very usual and have direct contact with the team, so everybody knows at which point we are and at each point.

Me: Were you in now.

En: Yes, and from my reward perspective the other possibility that the team leader has to reward their people is the other things that are not directly related with money, or the salary, or public recognition. That is whenever people are willing to make a specific course, or travel to a specific meeting that is abroad, or the best recognition or the best reward you can give most of the time is knowledge. Allowing them to go to a conference, or the company buys a book, or sends them in a specific course that is external to the company. It's very motivational.

Me: But helpful.

En: Yes. It's very helpful.

Me: I noted some questions from what you're explaining to me about your experience using motivational element. I have noted some points. But before these points, I would like to ask you how you can describe the stage before agreeing on this motivational element, how these steps where. How the map, or the strategy, or how you discussed, how we are going to motivate our employee? Have you engaged them in a meeting? Have you asked them?

En: Yes.

Me: - and take their experience, or their comments, or just design it and let them use it?

En: Well, I will explain to you now the official and corporative methodology to that and my particular adaptation. From an official perspective, the way we usually do it is at the beginning of the year and we have what we call an "annual meeting" and there we sit together. The responsible for the team leader, the project leader or the manager we sit with every person of our team individually.

En: No, no. Only with our employees. This is only for people working at our company. The methodologies that you have to see at the beginning of the peace career and decide where do they want be or what do you expect from the upcoming year. There we sit, we talk to them and they give their feeling, "This year I want to work a lot, I want to be in this position. I want to learn this technology, I'm not happy at this project and so on." And in this meeting we need to define what are their expectations.

En: The idea is we have an internal system where we write down all these agreements. And there we said the objectives for the idea. If there's a disagreement, the person has the figure of a mentor that is external to the current project. It's their mentor for as long as they are inside the company, it's the same person for them, so they should reach this mentor to solve any problem. But we usually don't if there's a disagreement it comes out in this meeting and we handle it.

I have done many of these meetings and many meetings like this have been done to me, and if there is a disagreement it comes there or at least it pops up there. And the thing is that, these goals that we reached should be independent from the project that we are in. We have these annual meetings where we set our objectives and the projects in which you participate during that year which doesn't necessary have to be one, it could be two, three or have three parallel projects and so on.

All of them should add towards these objectives that you have set annually. If all the projects together do not qualify to give you the experience, or the knowledge, or whatever you need to reach those objectives, you should say in advance and we should argue whether you need to change that goal, to change project, or review the objectives that you have set at the beginning of the year. And these objectives should be reviewed at least once, at least twice - one in the mid term of the year and then one at the end. And with that, at the end we'll make a review of the objectives.

Me: Who reviews it? The manager only?

En: No. The leaders as well. Let's say that the direct responsible for their person participates always in the reviews. And because you are not always in contact with the manager of the project.

Me:. Do you think situation using motivation amongst your workers; could it carry a conflict between them? You said that everyone knows everything about others, what they are doing now, how is their performance. This might cause conflict between them, "So you're doing well, I'm not doing well. I can see your result, I can see your performance, your effort." It could create conflict between us?

En: It does create conflict, but not in the way that you're mentioning and I will explain myself. It creates conflict because in my company every year, we get so much money for salary increase. What we do is that we all the leaders and managers, we sit together, we have our budget for salary increase, and then depending on the reviews and the objectives that the people have reached, we decide who gets what. There, we compare between people, the review at the end of the year, we review just the person and they have reached from and individual point of view if they have reached their objectives.

After that review, we all meet together and talk about money and how we should distribute i,t and who gets a pay increase and who not. Then we are comparing people, which is different from the individual review. There are conflicts of course because at the end we communicate with the people, "Okay, you get this increase,you get that." And there might be some problems, but the problems do not normally arise between people from the team because they think, "I should have gotten more money than you."

They are usually directed towards the people responsible that are the ones doing the distribution of the money. By saying, "Okay, you told me that I reached my objectives, but never the less, I didn't get this and that salary increase." This is normally because after those annual reviews, we need to compare between people. But there are sometimes like problems but not that many. The rate, so to say, or the problems are mostly directed towards the people that are coordinating, or managing, or responsible over the projects and responsible of those increases.

Me: But have you used any strategy or something to solve the conflict when it rises up? When they have conflict, "I'm doing hard and I get different than what I was expecting."

En: Yes.

Me: Can you use any strategy? We call it strategy but it's normally anything you might use to solve the conflict.

Part 2: Results of the interviews

Ideas of how to resolve the conflict between work members in within a group or in different groups by running interviews involved psychologists , practitioners, software engineers and managers on 8-15/9/2016 and from the literature:
Conflicts resolution strategies sample:

(1) Pre-operation strategies: to set up the scene for the system

-
- **Commitments:** from all of the participants. It could be reached by running a negotiation session to explain views and exchanging offers.(Forsyth, 2009)
- **Common ground rules:** such as, respect others, everyone has a say, no wright answers, privacy, and confidentiality.
- **Facilitator:** to manage the discussion sessions.
- **Anonymity**: write your opinions down without your name.
- **Voting:** to agree on a solution. (facilitator can manage the process)
- **Norms:** get everyone understand the culture of the organisation
- **Transparency:** so everyone can knows every-things about others e.g. their performance in the task, their level in the motivation system etc.
- **Rotate**, you will be randomly allocated in the rewarding system is the same job but your comparison will be not going to be same people all the time.
- **Get everyone involved** (people in a different roles) in a discussion to discuss behaviours and penalties in the organisation.
- **Give them a task:** or scenario at the beginning or something to play with at the beginning of the participatory session to understand the problem in order to build the solution.
- **Story telling:** presenting the situation in a story so the conflict can be easily understood and discussed.
- **Round robin**: when everyone has an opinion on something and the discussion go through them one by one and everybody has to give his ideas individually.
- **Auditing:** for example, give a quantity task and assuming they will respect the quality as well.
- **Split those who have close collaborator randomly from time to time**
- **Another Reward for individual contribution**
- **Strategies for Collaborative method**: e.g., "discussing the issues" "cooperating to better understand others' views" "settling problems through give and take".(De Dreu and Van Vianen, 2001)

(2) During the operation strategies: to resolve the conflict or detect irregularities

- **Corrective measure:** where everyone's performance can be measured
- **Subordinate person**: who can see all of things going on in the groups. Or other types of moderators who has a power to observes their outcomes.(LaTour, 1978).
- **Give them a task:** or scenario at the beginning or something to play with at the beginning of the participatory session to understand the problem in order to build the solution.
- **Story telling:** presenting the situation in a story so the conflict can be easily understood and discussed.
- **Auditing:** for example, give a quantity task and assuming they will respect the quality as well

- **Member-checking from time to time**: after finishing the task sample of members could be involved to check the analysis result
- **Random monitoring** which could happen at any time
- **Managerial level monitoring**
- **Split those who have close collaborator randomly from time to time**
- **Have peer rating technique:** your colleague can rate your effort and might check at any time to avoid bias evaluation.
- **Anonymous rating:** so no one knows their reviewers
- **Self-assessment:** you can assess your-self but it might be checked at any time.
- **Strategies for Collaborative methods**: e.g., "discussing the issues" "cooperating to better understand others' views" "settling problems through give and take".(De Dreu and Van Vianen, 2001)
- **Tit for tat (TFT)** or "this for that", the idea behind this strategy is one groups start by cooperating with each other if the other group cooperate too, but when the other group competes then TFT start to compete them.(Forsyth, 2009)
- **"Noncontentious bargaining"** when the conflict between members flare they should encourage their group members to try to control their emotions in a good way such as, writing their concerns in an email or letter carfully. (Forgas, 1998)

Part 2: Focus group

Scenarios used in previous studies ((Shahri et al. 2014)

Scenario 1 (Conflict of Interest):
Environment:
The focus is on the IT Department. IT department consists of two teams, IT Support and IT Development. Alice, Jack, and Bob are members of the development team. Suzy, Lucy, and Bob are members of IT Support team.
The development team is tasked with designing a new UI for the customer portal as there has been reports of the current UI not being very user friendly and implementing the final design. The support team is responsible for troubleshooting IT problems and repairing them.
It is important for the organisation to have a collaborative working environment.

SbM:
Each member of the support team is given a badge if they perform their task within a given time. The time is decided and set by the project managers according to the difficulty and effort needed for each task based on previous experiences.
The company decides to provide a leader-board of top UI designers. Each member of the development team is asked to design a UI and at the end, the designs will be polled amongst all the employees to choose the best design and ideas that fulfils users' requirements and improves users' experience. The winner design will receive 20 points. If any feature of a UI design (which was not chosen as the best design) is used in the final artefact, the designer will receive 2 points for each used feature, with a limit of maximum 10 points.
The points can be spent on buying extra paid holidays, each day costs 100 points.
Problem:
Bob is in the IT support team as well as being a member of the development team and he is responsible for maintaining and repairing faults with the computer systems as a member of the IT support team. Bob will receive points for fixing the incidents on a given time. If Alice needs a hardware support that relies on Bob, since they are both competing on the same goal and Alice's tasks depend on Bob's task to be performed, Bob may hinder and delay as much as he can so he can have more time and come up with a better design to win more points.
This situation is more likely to happen if there is a punishment strategy followed by the organisation for those who do not appear in the leader-board for at least a minimum number of occasions in a period of time.

Scenario 2 (Bribe for an exchange):
Environment:
In this scenario, we focus on the IT Development team in the IT Department. The team consists of Alice and Bob. There are three current tasks that need to be performed. The tasks are as follows:
- Designing a new UI for the web application of the organisation,
- Updating the payment portal of the customer side of the web application (firm deadline),
- and preparing a risk assessment report (firm deadline).

Bob and Alice work on the Design tasks. Alice is responsible for the updating task and preparing the risk assessment report. The risk assessment report is marked as high priority report and must be prepared on time, otherwise it will have a very negative

impact on Alice's image for her managers. Also, the updating task has to be done quickly as the current payment system is having a very negative impact on the customer satisfaction.

Alice is short in time for preparing the report and asks her manager if the update task can be delegated to Bob. The manager agrees to this with the condition of Bob volunteering.

SbM:

In order to encourage the employees to come up with high quality designs, the organisation has decided to give points to the winner design and put it on a leader-board. Those who remain in the leader-board at the end of year will receive a £500 Amazon voucher as a prize.

Problem:

Since Bob is competing with Alice on the design of UI, there is a danger of Alice offering to let Bob win the design in order to make it as an offer that Bob cannot reject, or even Bob asking Alice to let him win in order to accept the delegated task. This is not aligned with the business goal of the organisation and may decrease the quality of the design. Since in this situation, only one of the two is going to work on the task, Bob knows that he will win the task anyway. Therefore, there is a risk of Bob reducing the quality of his work as he sees himself the winner for the design already.

Scenario 3 (Free Riding):
Environment:

The development team of the IT Department consists of two teams. Team 1 is mainly responsible for developing the front-end, and team 2 is mainly responsible for back-end development of the web application. Alice, Bob, and Mary are members of team 1, and Jack, Matt, and Suzy are members of team 2 of the development team. Team 1 is given a task for updating the design of the UI as there were complaints about the current design, causing the loss of a great percentage of customers. The managers have given this task a high priority and are asking team 1 to update the UI as soon as possible.

Bob calls sick and cannot make it to work for a few days. The managers delegate Bob's tasks to jack from team 2.

SbM:

Each team will receive points that will help them to level up and receive badges. Each time a team levels up, the company provides team members with additional holidays according to the effort needed for that levelling up.

Problem:

The policy that is followed by the organisation, does not acknowledge the efforts of any contribution from another team. Since Jack is not a member of the front-end development team, his contribution will not be identified and acknowledged. Therefore, he may put minimum efforts and rely on the fact that the other team members will do the task at the end.

Scenario 4 (Sabotage):
Environment:

Alice, Bob, and Mary are team 1 of the development team. Jack, Matt, and Suzy are team 2 of the development team. Team 1 is mainly responsible for designing the UI, and team 2 is mainly responsible for back-end development of the web application.

Team 1 is given a task for updating the design of the UI as there were complaints about this current design, causing the reduction of a percentage of customers. The managers have given this task a high priority and are asking team 1 to update the UI as soon as possible.

Bob calls sick and cannot make it to work for a few days. The managers delegate Bob's tasks to Jack from team 2.

SbM:

Each team will receive points that will help them to appear on the leader-board. At the end of each week, the team with the highest score will receive a token. At the end of each year, the team with the highest token received will be given an extra raise to the team members salary. The points are given on a group basis.

Problem:

Since it is in the interest of Jack for team 1 to lose, not only social loafing may happen, which is Jack relying on others to perform the job, Jack may intentionally hinder the job and cause a delay so his team wins and receives the token.

Scenario 5 (Secrecy):

Environment:

In the IT Department, there are various teams working on Big Data trying to analyse and predict the market behaviour. The teams normally use conventional data mining algorithms or sometimes, enhance the algorithms to fit their needs. It is very important for the organisation to have a more precise prediction of the market. The more precision in the forecasting may lead to a substantial jump in the organisations total market share.

SbM:

The organisation is looking for solutions that can encourage the Big Data teams to increase the precision of their predictions. Therefore, they decide to gift shares to the members of the team that makes the most precise predictions and increase the profit of the organisation at the end of the fiscal year.

Problem:

The company is seeking more precision in the market predictions. Therefore, it needs to encourage its employees to find or develop algorithms that fulfil this goal. However, a competition on a high value reward may lead to secrecy amongst the groups. A group may find a solution that can enhance the prediction to a great extent. Nevertheless, the team members may decide to keep the solution as a secret instead of sharing it with other groups in the organisation. Secrecy in this scenario can help the group to secure a winning slot at the end of the fiscal year. However, secrecy can limit the number of people who work on the new found solution and prevent further enhancements.

Scenario 6 (Workplace Intimidation):

Environment:

In the IT Department, the front-end development team is responsible to make sure that the UX is kept at a satisfactory level and update the UI when necessary to address the requirements of the customers. Collaboration of the team members is crucial to the success of the team and failure in a proper communication and collaboration may lead to a dropdown in the final artefact. The UI holds a very important value for the organisation as this is the face of the company in the clients' eyes. Therefore, the organisation wants to decrease the chance of a failure in the design of UI as much as possible.

SbM:

In order to encourage collaboration, the organisation tries to reward the front-end development team as a group. For communication and tracking purposes, team

members have access to each others' detailed work performance. This can help them schedule the plan and make changes easier if necessary.

Problem:

The organisation is seeking to provide a collaborative environment for the front-end development team and decides to reward the team based on the overall performance of the group. However, since team members have access to each others detailed performance information, there is a risk of shaping clusters in the group, team members with higher performance may feel closer to each other, or even this may pave the way for workplace intimidation causing some high performance employees to bully other lower performance colleagues in the group.

Part 3: Focus group materials used for the mapping of the management strategies with the risks.

Scenario 4 (Sabotage):

Scenario 5 (Secrecy):

Scenario 6 (Workplace Intimidation):

Scenario 1: (Conflict of Interest):

Scenario 2 (Bribe for an exchange):

Scenario 3 (Free Riding):

Part 4: focus group materials

Using cards to map the management strategy with the risks in the scenarios

Commitments (1)	Common ground rules (2)	Facilitator (3)
Anonymity (4)	Voting (5)	Norms (6)
Transparency (7)	Rotate (8)	Get everyone involve (9)
story telling (10)	Round robin (11)	Auditing (12)
Subordinate person (13)	Member-checking from time to time (14)	Random monitoring (15)
Managerial level monitoring (16)	peer rating technique (17)	Self-assessment (18)
Strategies for Collaborative methods (19)	Tit for tat (TFT) (20)	Noncontentious bargaining (21)

Regular Meeting (22)	**Reward for Helping Others (23)**	**Acknowledge individual effort (24)**
Secrecy (25)	**Task Quality Assessment (26)**	**From You**

11.3   APPENDIX 3

This appendix will present the materials used in the research resulted in Chapter **6**

Part 1: Focus group materials

Information Sheet

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Information Sheet

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The title of the research project
Designing Gamification for Workplaces

Invitation

You are being invited to take part in this research project conducted by Abdullah Algashami, a research student in the Department of Computing and Informatics, Faculty of Science & Technology, Bournemouth University, UK. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. You will be asked to sign a participant agreement form and at the end of the session you will be given a copy of this information sheet and a copy of the signed participant agreement form.

What is the purpose of the project?

The aim of this research is to study how to engineer gamification systems for a workplace in a way which could help to increase its efficiency and minimise side-effects. A common technique is where a game element are added to the online system and users' performance is reflected in a form of badges, points, leader boards, status, progress bar, timer, etc. I aim by conducting this study to explore the main risk factors which might affect the system and introduce risk to the work environment and sketch them with mitigation strategies to minimise the effect of such risks.

Why have I been chosen?

You have been chosen because of your background and expertise and reputation in the research, development and practice of gamification and its related area. The research team believe your feedback will be beneficial to consolidate the approach and mechanisms proposed in this project.

Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a participant agreement form. You can withdraw at any time, up to the point where the data are processed and become anonymous, so your identity cannot be determined, without it affecting any benefits that you are entitled to in any way. You do not have to give a reason. Deciding to take part or not will not adversely affect you.

What would taking part involve?

As a participant in this project, there will be some activities to undertake. Firstly, you will fill a short pre-selection survey to gather your demographic data and your experience with gamification elements. If based on the information you provide you are selected for the next stage of the project, you will be asked to take part of an interview or a focus group. This could be done in person or by audio or videoconference depending on your preferences, location and availability. In the next stage (the researcher) will ask to get permissions to observe your

group's work and interactions with the gamification system. This is to help me understanding how the transparency elements might have affect in the acceptance and validity of the gamification system.

What are the advantages and possible disadvantages or risks of taking part?

Whilst there are no immediate benefits for those people participating in the project, it is hoped that this work will improve our understanding of the usage of gamification in workplace and how we improve the design that can help to maximise the acceptance of such technology and minimise side-effects.

How will my information be kept?

All the information that I collect during the course of the research will be kept strictly confidential. You will not be able to be identified in any reports or publications. All data relating to this study will be kept for 5 years on a BU password protected secure network.

Will I be recorded, and how will the recorded media be used?

Yes. The recording will help the research team to capture the information that will be sought from you during the interview or the focus group. However, you will be given the right to accept or reject the recording. No other use will be made of the recording without your written permission, and no one outside the research team will be allowed access to the original recordings. The audio recordings made during this research will be deleted once transcribed and anonymised. The transcription of the interviews will not include your name or any identifiable information. Instead, each person will be identified by their code (i.e. #id523741, #id523753, etc.).

Contact for further information

If you have any queries about this research please contact Abdullah Algashami by email on aalgashami@bournmeouth.ac.uk or by phone on 01202 961217 or by post to:
Abdullah ALgashami
Department of Computing & Informatics
Faculty of Science and Technology
Bournemouth University
BH12 5BB

Complaints

If you have any complaints about this project please contact Professor Tiantian Zhang, Deputy Dean for Research and Professional Practice of the Faculty of Science and Technology at Bournemouth University at the following address:
Professor Tiantian Zhang
Talbot Campus, Fern Barrow, Poole, BH12 5BB
E-mail: researchgovernance@bournemouth.ac.uk
Tel: 01202 965721

Thank you for taking the time to read this information sheet, and please do not hesitate to contact me if you have any queries.

Part 2: Focus group

Research Study Overview:

Study title

Gamification in a Business environment

Background & Aim

Gamification refers to the use of digital solutions in order to facilitate a change of attitude, perception and behaviour with regards to adopting policies, achieving goals and executing tasks increase people desire toward implementing tasks and achieving goals. A common example of such technique is leaderboards, Badges and avatar. For example, in a leaderboard people are motivated to increase performance by showing their names in order based on their performance in a task. This research study is being conducted by Abdullah Algashami and supervised by Dr.Raian Ali an academic member of the faculty of Science & Technology at Bournemouth University. It aims to mapping between the results in previous study conducted in chapter four and five (the risk factors, risk and mitigation strategies see picture1) in particular between the risks and the mitigation strategies. Also, it will help to configure the modality of use of such mitigation strategy in order to increase the chance of effective implementation of such system in a business environment. By conducting this research, the way towards assessment method to detect and predict DM risk from its early stage and minimize the negative will be pave.
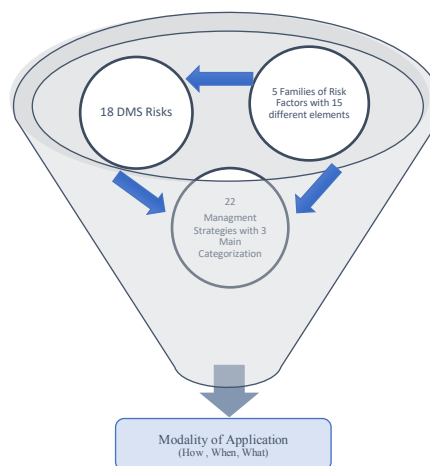
FIGURE: MAPPING PREVIOUS STUDIES WITH NEXT STEP

Study Main Focus

A focus group with 7-9 participant followed by an open discussion in order to refine the final set of outcome is in this study. The main focus will be to answer the following three main questions:

- **How the management strategies can be applied to manage DMS risks?**
    - Mapping the most appropriate management strategies to tackle the potential risk.
    - For which purpose (Prevention, Alleviation, Resolution, Detection)
    - In which way (individually, collectively in group, by manager, system designer)
- **What is the most appropriate time to apply such strategies to the DMS?**
    - At the design time after a prediction process of the likelihood of the risk.
    - At the real-time after the risk occur.
    - In both times.
- **What sort of stakeholders should be involved in the process?**
    - Stakeholders who can be involve in the decision made process to decide the configuration of the management strategy to tackle the risk.
    - Stakeholders who should be involved in the management strategy itself to manage the risk.

The session will rely on a collaborative technique in which participants could discuss and cooperate in order to incorporate ideas into the design of the management strategies to effectively managing the DM risk in teamwork environment. The procedure of collaborative design session is described in details in the next section.

Procedures

The focus group study will be based on hybrid card sorting technique which can be used to get people to rank or arrange items based on set of criteria. Also an affinity diagram technique will be used to gather and organise ideas or issues and organise them into groups based on specific relations. This also will be supported by a consensus building method which is a conflict-resolution process used to settle complex by involving group of stakeholders with different interests to get as close as possible to meet the interest of every stakeholder. Participants will evaluate and modify the predetermined concepts and elements based on set of criteria.

Study Phases

The study will involve different stages:

1. **The first stage:** will be focusing mainly on the activity number 2 and 3 in table 1. It will help to ensure that the participants are aware of the type of risk such technique might introduce to the teamwork place and agree on the factors on DMS might cause these risks. This will include the determination of the likelihood of the risk to occur in the DMS teamwork and the severity it might introduce to the system.

2. **The second stage:** will focus on activity 4 in table 1. It will concentrate in the suitability of the proposed management strategies to manage the DMS risk. This will include activities like sorting the management strategies in cards with the risk also identifying the potential side-effect of the strategies if any.

3. **The third stage:** this stage will focus on the activity 5 in table 1. In this activity participants will be asked to categorise the management strategies based on different modalities of use in order to manage the DMS risk on teamwork. This will include the way these strategies can be applied, the purpose, the time and the stakeholders involved. This activity will use affinity diagram tool in order to categorise these strategies and organise different ideas.

TABLE 35: SESSION STRUCTURE

During the focus group				
Phase No.	**Activity**	**Description**	**Notes**	**Estimated time**
1	Introduction	The facilitator will brief you with the study goals and structure. This includes reading the information sheet and signing the consent form.	-------------------------------	10 min
2	Scenario reading	You will be given scenarios which give you examples of the risk and how it can be occur in teamwork environment in order to immerse you with the problem	The scenarios will try to cover the most common risks in the teamwork places.	15 min
3	Review	You will be provided with a copy of the ontology structure of the risk main factors and examples of risks to review them **individually** and make notes in document number 3. In this activity you will be asked to identify the likelihood of the risk in a specific situation and the severity the risk might introduce.	Notes might include missing concepts or categorise, structuring issues and probably refinement suggestions.	10 min
4	Sort	You will be provided with set of concepts and categories in cards to map the risks with the most appropriate management strategies. This is a **teamwork activity**.	You can add countermeasures or remove some. Disagreements are expected to arise but resolved during the discussions. The remaining unresolved ones will not be ticked in the notes form.	15 min
5	Grouping	You will be given different Modality of application of these strategies and will be asked different questions and will try to group the concepts around different categories of	This activity aims to answer the questions of how, when and whom. In this activity you will be given criteria to help you to take decisions	30 min

		application.		
6	Discuss	Each one will discuss the output and highlight any disagreements and recommendations for resolution.	------------------------------	10 min

TABLE : PROVIDED DOCUMENTS DURING THE FOCUS GROUP

Provided documents		
Doc. No.	Name	Description
1	Consent form	- - - - - - - -
2	Information sheet	- - - - - - - -
3	Ontology structure with note space	The structure of the main risk factors in DMS teamwork
4	List of risks	List including 20 risks might affect the DMS on teamwork
5	List of management strategies	List of management strategies including 22 strategies with their explanation.
6	Modality of applications	Different categorisations for different applications and each one including criteria which could help to understand and support decisions.
7	Cards	Predetermined cards with extra blank ones will be provided to enable suggesting more concepts/categories.

Study location and recruitment:

The study will be conducted at a business Company. The study will be hold in the call centre department where workers are been motivated to increase performance using one or more DM techniques. Participant will be recruiting to the study based on their experiences with DM elements in a business workplace. They need to be employees and managers to look at the problem from different perspective. Participant will be given information sheet which explain the study and the purpose of it and a consent forms to confirm their agreement to participate. The proposed start date of the study is **/*/2018 and the proposed end date is **/*/2018.

Focus Group Map

Read the information sheet **Sign the consent form** **Read the overview**	➡ **Induction Session** ⬅	**Consent form** **Information sheet** **Research overview**

⬇

Read the ontology of the gamification risk factors and add your comments in the spaces	➡ **Ontology Structure** ⬅	**Ontology of gamification on teamwork risk factors**

⬇

Read the scenarios and answer the questions in pairs **Use the management strategies to solve the problem in each**	➡ **Modality of Application** ⬅	**Scenarios to explain the problem** **List of management strategies** **List of Risks**

⬇

Use the sticky notes to map the strategies with the risks	➡ **Mapping and Sorting** ⬅	**List of risks** **List of management strategies** **Description of the management strategies**

⬇

General discussion and finishing the session

Strategies and Design Principles to Minimize Negative Side-effects of Gamification Elements on Teamwork

List of 22 strategies organised and classified under 4 main families based on their characteristics as follow:

Strategies for Collective Agreements and Participatory Decisions:

(1) Commitments   **(2) Facilitator**   **(3) Voting**

(4) Round robin

Strategies for Setting up Rules:

(5) Get everyone involved   **(6) Norms**   **(7) Common ground rules**

(8) Regular Meeting

Strategies for Observing, Checking and Inspecting the Work Environment:

(9) Auditing   **(10) Random monitoring**   **(11) Member-checking**
(12) Peer-rating   **(13) Managerial level monitoring**   **(14) Self-assessment**
(15) Story telling   **(16) Transparency**   **(17) External Party**

Strategies for Controlling and Managing the Work Environment:

(18) Anonymity   **(19) Rotations sensitivity**   **(20) Non-contentious bargaining**
•
(21) Reward for helping others   **(22) Acknowledgment of individual**

<u>Description of Risks Management strategies on Gamification within Teamwork environment:</u>

-
- **Commitments:** from all of the participants. This strategy is based on the members' agreement and adoption of the choices and actions characterizing how DM is going to operate.
- **Common ground rules:** This strategy is based on deriving and enforcing rules that articulate the set of acceptable behaviours in relation to DM such as, respect others, everyone has a say, no wright answers, privacy, and confidentiality.
- **Facilitator:** facilitating the design sessions of DM, including running negotiation sessions, helping people to understand the common objectives of a group and assisting groups to set the common rules of conduct in an effective work environment supported by DM.
- **Anonymity**: To give opinions or ratings of colleagues or managers in an anonymous way.
- **Voting:** to reach a decision in a facilitated session.
- **Norms:** on having a clear understanding of what the organisational culture is, e.g. normal social behaviours.
- **Transparency:** So everyone can knows every-things about others e.g. their performance in the task, their level in the motivation system etc.
- **Rotations sensitivity**: allocating people randomly within DM system so that cliques and rivalries are not created.
- **Get everyone involved**: Encourage people in different roles to become involved in a discussion to decide behaviours and penalties for their DM system.
- **Story telling:** To identify negative effect by asking people to present a situation in a story.
- **Round robin**: Pass the discussion between workers one by one to ensure everyone gives their ideas individually.
- **External party:** this strategy proposes to use an external authority or expert to check workers' performances and to resolve negative effects.
- **Non-contentious bargaining:** Encourages team members to control their emotions in a professional way, such as "counting to ten" before taking an action, writing down their concerns carefully in an email or letter with a calm manner.
- **Reward for helping others:** this strategy is related to prosocial theory, in which users can be rewarded for supporting others.

- **Acknowledgement of individual efforts:** in some DM situations negative effect on teamwork might arise when individual efforts are not equal. So this strategy could help to inspire individuals to engage in group tasks to completion.

- **Auditing:** checking individual performances for example, give a quantity task and assuming people will respect the quality as well.
- **Member-checking**: this strategy utilises a sample member in order to analyse the eventual DM result after finishing the task.
- **Random monitoring:** Keep workers ready all of the time as their performances might be monitored at any time.
- **Managerial level monitoring**: managers take the responsibility to check workers' performances in DM workplace.

- **Peer rating:** this technique means that colleagues can rate each other's efforts and might be checked at any time to avoid a biased evaluation
- **Self-assessment:** users assess their own performances, and this might be checked by managers at any time.

Regular meeting: involving teamwork members in regular meetings, e.g. weekly, monthly or annually would help managers to remain updated with the current use of DM system

Part 5: List of 18 risks categorised under 5 main factors

Performance Related Risk:

(2)   Free Riding   (2) Clustering groups   (3) Bribe for exchange

Social and Personal Related Risks:

(4) Counterproductive comparison (5) Negative pressure   (6) Lowering self-esteem

(7) Anchoring Bias   (8) Misjudgements of performance (9) Novelty effect

Goals Related Risks:

(10)   Deviation from goal (11) Lack of engagement   (12) Meet the minimum requirements

Task Related Risks:

(13) Social Loafing   (14) Reduce task quality   (15) Work intimidation

Gamification Element Related Risks:

(15) Infringe autonomy   (16) Kill the joy   (17) Perceived exploitation

Focus group Scenarios

Activity 2: <u>Scenarios</u>

<u>**General Scenario**</u>

Thomas works as a call centre supervisor at a Telecommunication Business Company. The department has four supervisors each one supervising two teams in the department. John, Alice and Lara are in the first team and Emily, Sophie and James are in the second team managed by Thomas. Both teams are working in the call centre as customer support team to answer and solve customers' calls. The first team is mainly responsible for customers' calls in relation to IT services while the second team is responsible for the sales-related calls. The department has no criteria for allocating staff in teams, so staff mixed with different abilities, ages, genders and experiences. The department is using three main gamification techniques to motivate staff, (i) a leaderboard to motivate them as teams where the teams names sorted based on the number of calls each team have answered, (ii) a badge to motivate staff within the same team and encourage them to do a different subtasks based on what the department is focusing on in each month (iii) avatar for the sales teams staff can customise how they want to present themselves to others in the department website. Each avatar designed to describes staff based on the number of sale transactions achieved. The supervisors are responsible for managing the badges and the avatar given to their teams' members while the leaderboard is under the responsibility of Jack who is the department manager. The badges are given at the end of each month to an agent in each team based on different individual tasks assigned via the supervisors while the avatar is based on the number of sale transactions. The leaderboard displays a list of top teams in solving highest numbers of customers' calls in actual time base. After every three months, the winning team at the top will be rewarded a 10% extra for their total monthly salary.
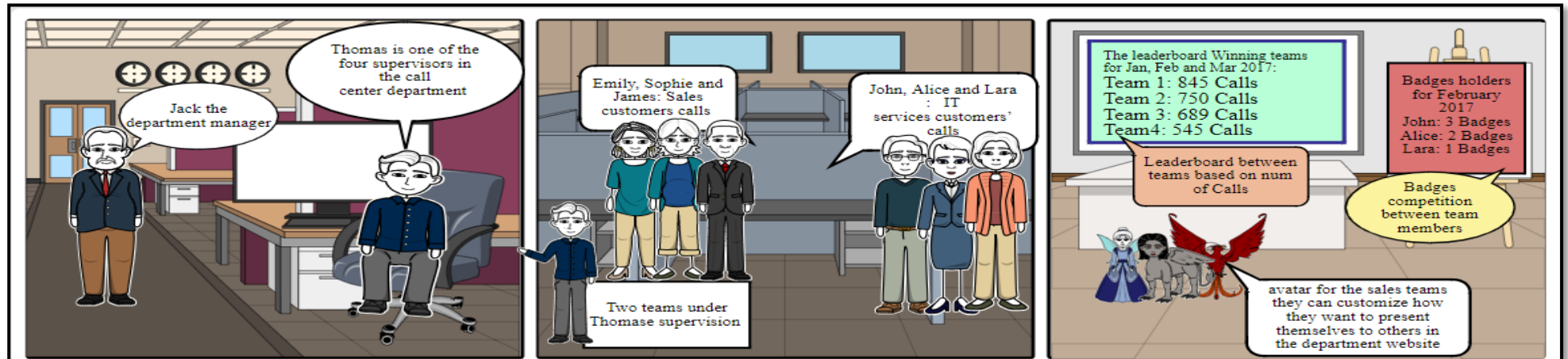
Q1: How can the management strategies should be applied to manage gamification risks? (Doc. 4 and 5)

Activity (1): mapping the most appropriate management strategies to tackle the risk.

Activity (2): for which purpose (Prevention, Alleviation, Resolution, Detection, others)

Activity (3): in which way (Individually, Collectively in group, By manager, System designer, others)

Q2: What is the most appropriate time to apply such strategies to the DMS?

 Activity (4): discussion of a various application time (At the design time, At the real-time, In both times, others).

Q3: Who are the stakeholders to be involved in the process?

Activity (5): stakeholders who can be involved in the decision making process to decide the configuration of the management strategy to tackle the risk.

Activity (6): stakeholders who should be included in the management strategy itself to manage the risk. **DMS Risk on Teamwork Environment**

1. Performance Related Risks

In DM apply in a teamwork environment risk can be occur for different reasons and some risk might be related to one or more factors which could introduce them to the workplace. This section will discuss the risk which has a high chance to occur in teamwork as a result of staff performance in relation to the DM.

1.1 Free Riding
Free riding is a situation when a member of the team performs less as he/she knows that others will implement the task and the DM element does not acknowledge individual performance.
Situation/Reason:
This risk has a high possibility to occur in collective tasks with no measurement of individual contribution.
Scenario:
Since the performance in the leaderboard is measured collectively, John contribution in the task is less than the required level. In the end, he wins the 10% increase in his salary because he relies on his teammates to answer more calls and be in the top of the leaderboard. In the same time, he is holding the highest number of badges in the individual task which has a negative effect on the group coherence and introduces conflicts to the workplace.

Q1: Mitigation Strategy: Which	Q1: Mitigation Strategy: How and Side effect	Q2: Timing and Duration	Q3:Stakeholders
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1.2 Clustering groups

Dividing a group into intragroup

<u>Situation/Reason</u>:

This is a common risk which could occur in the teamwork place for different factors, e.g. performance feedback sends to the group, the transparency feature in the system.

<u>Scenario</u>:

Thomas sent his feedback which includes the winner of the badge for April also a record of the number of badges each member are holding for the previous three months. Sophie wins the highest number of badges from the first team and Alice from the second team. This makes Sophie and Alice become close friends, sharing interest and always discussing ways to improve their work in pair as they are the top two winners. In such situation, this starts to shape intragroup in the workplace based on staff performance.

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1.3 Bribe for exchange

Bribe for exchange is a case when a staff allows another member to win to get a favour or ask another agent to let him/her win when being asked to help. This risk can happen when there is a dependency to perform a task.

Situation/Reason:

This risk can exist when the staff required others to perform a task (dependency)

Scenario:

James has no interest in winning badges. He is more interest to win the collective reward which is 10 % increase in his salary. As a result, he offered Lara from the other group to help her winning more badges in order to hinder her team from winning the collective reward to increase his team chance of winning the leaderboard reward.

Q1: Mitigation Strategy: Which	Q1: Mitigation Strategy: How and Side effect	Q2: Timing and Duration	Q3:Stakeholders
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2. Social and personal related risks

2.1 Counterproductive comparison \ Negative pressure \ Lowering self-esteem

These main risks can occur in the teamwork and can have an adverse effect on individual performance.

Situation/Reason:

Competitions amongst team members and being compared with others with different ability, experiences, age and gender are the main factors of these risks.

Scenario:

Staff are distributed randomly into teams, Lara finds it challenging to engage in the system as she feels that Alice has more chance to win the badges because she has more experiences and abilities in such motivation system. This has an adverse effect on Lara performance and makes her less motivated to engage in the badges competition. She also starts to lose her confident of being able to work in such environment.

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2.2 Bias \ Misjudgements of performance

Receive unfair judgements.

Situation/Reason:

The measurement of staff performance or the unequal comparison might be the main factors to introduce such risk.

Scenario:

Thomas, the supervisor, discusses with Emily the number of badges she owned as they are lower than the minimum level. She complains that the numbers of badges are not reflecting the actual effort because she spends long time to make sure customers are aware of the reason behind their complaints and ensure they are satisfied with her answers. While, Sophie who has the highest number of badges focusing only on increasing the number of calls regardless of the quality of her work to earn more badges which in turn, will result in a reduction in customers' satisfaction level. As a result, Thomas sent performance feedback to all of the team members with special thanks to Sophie. This has an adverse effect on Emily which resulted in less engagement in the task in the forthcoming months and paying less attention to the quality of the work.

Q1: Mitigation Strategy: Which	Q1: Mitigation Strategy: How and Side effect	Q2: Timing and Duration	Q3:Stakeholders
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2.3 Novelty effect

Novelty effect in human perception of new technology refers to the tendency to be initially exciting for new technology, but become less useful for those with more extended experience.

Situation/Reason:

The novelty effect might occur when a new member participating with an existing team. Or when applying new motivating technique.

Scenario:

Thomas discusses with Alice the drop in her number of badges achieved in the last month compared with the first three months of the year after joining the work. Alice agreed that she lost her motivation to win the badge reward and only focusing on the leaderboard because she is more interest with tangible type of rewards.

Q1: Mitigation Strategy: Which	Q1: Mitigation Strategy: How and Side effect	Q2: Timing and Duration	Q3:Stakeholders
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3. Goals Related Risks

3.1 Deviation from goal

Deviation refers to the difference between the desired behavior of a person and their actual behavior.

Situation/Reason:

Deviation from goal mainly might occur when the staff facing difficulties to achieve the goal or have no words in the goal assignment.

Scenario:

Thomas the department supervisor tells his teams that at the end of the month the one who will be able to involve in the badge of the month reward should at least have answered 300 calls in each week. This makes James who found it difficult to answer such number of calls in each week to lose his interest to improve his work to involve in the badges competition.

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3.2 Lack of engagement \ Meet the minimum requirements

Lack of engagement and meet the minimum requirement risks are quite similar to the deviation from goal risk. Both can occur when the staff has no choice in the goal assignment which might affect his/her interest to achieve the goal or contribute to the task.

Situation/Reason:
when the staff have no interest in a goal or having a conflict of goals among the team members.

Scenario:
Emily, Sophie and James have a collective goal that at the end of the year each one of them should at least have won three badges. This will help them to ensure that everyone has contributed in the task as they tend to do. James has no interests in winning the badges competition but because the other two members in the group have agreed on the goal he has no other choices. Thomas, the team supervisor, has identified that James only meet the 300 call required for the badge competition and never improve his work to exceed this limit. He also identify that this makes the team coherence affected because he received many requests from Emily asking to change her team.

Q1: Mitigation Strategy: Which	Q1: Mitigation Strategy: How and Side effect	Q2: Timing and Duration	Q3:Stakeholders
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3.2

Infringe autonomy

Being obliged or pressured to be part of DMS in a prescriptive way.

Situation/Reason:
The monitoring mechanism is a primary feature in most of the DM elements. The invalidated design of such technique might trigger risk like infringe people autonomy to the teamwork places.

Scenario:
Jack the department manager received a complaint from Lara. She describes in her complaint email that Thomas, her supervisor, sent collective feedback to his both teams describing their work progress either individually or as teams based on his monitoring of their performance during the previous two months. This includes the number of calls she transferred to her teammates seeking for their help. Also, the number of customers' complaints she has received during the feedback period and the rate they have given to her. She did not expect that the supervisor can access even the calls she transferred to her teammates when she faced difficulties. She fined this over control of her performance source of negative pressure and had an adverse effect on her motivation.

Q1: Mitigation Strategy: Which	Q1: Mitigation Strategy: How and Side effect	Q2: Timing and Duration	Q3:Stakeholders
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3.3 Kill the joy

A prime aspect in most of the DM techniques to keep participants motivated is the surprise elements in the system. (E.g. changing the statues or avatar based on the user performance)

Situation/Reason:
Factors like making the system fully transparent to everyone in the workplace or allowing others to access the stored information about the user.

Scenario:
Jack, the department manager reviewed the result of the avatar motivation element for the first two months because the result is measured in monthly base. He identified that Sales staff in the department was holding the same avatar in both results with only slight changes. Thomas as a supervisor of one sales team in the department asking James, who has a low-level avatar, regarding what makes him remain with the same avatar in both results. He agreed that he is less motivated to compete with other sales staff because he has viewed their achievements in the previous year recorded. This has an adverse effect on his motivation to compete with them this year as there seems to be some staff holding the best avatar level through the whole results of the previous year.

Q1: Mitigation Strategy: Which	Q1: Mitigation Strategy: How and Side effect	Q2: Timing and Duration	Q3:Stakeholders

5.3 Perceived Exploitation

Exploitation refers to the unfairness staff might receive in relation to the DMS. For example, when the reward of the task does not reflect the actual effort required.

Situation/Reason:

One of the most factors where the exploitation has a high chance to exist is related to the rewarding system in the DM. **Scenario**:

At the end of the year, Jack the department manager sent a collective email to all of the staff in the department. Emily and Sophia were holding the top two numbers of badges in the department. Emily feels demotivated and decided not to compete in the badge competition in the next year because she is not rewarded while Sophia was holding the top number of badges with only one badge more than her. She feels that her extra performance is not rewarded.

Q1: Mitigation Strategy: Which	Q1: Mitigation Strategy: How and Side effect	Q2: Timing and Duration	Q3:Stakeholders
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Social Loafing

Social loafing refers to the phenomenon of people contributing less to achieve a goal when they involved in a team compared with individual tasks.

Situation/Reason:
Social loafing has a higher chance to appear if staff who involved in a collective task are motivated using inter-group competition.

Scenario:
Jack, the department manager decided to add a new DM element to increase sales competition. They add an avatar where staff can customise how they want to present themselves to others in the department website. Each avatar designed to describes staff based on number of sales transactions they achieved. Emily as a member of the sale team has more interests in the avatar DM element because she cares more about her image on others' eyes. Sophia one of the sales team supervised by Thomas, complains to him that Emily does not participate in answering costumers complaints task which is rewarded collectively using a leaderboard while she is holding a high-level avatar in her website. This has an adverse effect on the group coherence as they think she should contribute more to the collective task similar to what she did with the individual one.

Q1: Mitigation Strategy: Which	Q1: Mitigation Strategy: How and Side effect	Q2: Timing and Duration	Q3:Stakeholders
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Reduce task quality

<u>Situation/Reason</u>:
Reducing quality is a risk which might occur in DM teamwork when staff involved in a collective task where their individual contribution are not acknowledge.
<u>Scenario:</u>
In the previous case Emily after receiving a feedback from her supervisor regarding her participation in answering customer complaints task she decided to answer the required number of calls every week (300 calls) without paying any attention to the quality of her solutions or to customers satisfaction. This resulted in some customers' asking for other agents to help them which increase the load on her team mates and created conflict among them.

Q1: Mitigation Strategy: Which	Q1: Mitigation Strategy: How and Side effect	Q2: Timing and Duration	Q3:Stakeholders
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Part 7: Sample of one participant answers for first and second pages.

1. Performance Related Risks

In a gamification element applied to a teamwork environment, the risk to the workplace can occur because of different reasons. Some risks can be associated with one or more factors. This section will discuss the risk which has a high chance to occur in teamwork as a result of staff performance in relation to the gamification.

1.1 Free Riding

Free riding is a situation when a member of the team performs less as he/she knows that others will accomplish the task while the gamification element does not acknowledge individual performance.

Situation/Reason:

This risk has a high possibility to occur in collective tasks with no measurement of individual contribution.

Scenario:

Since the performance in the Leaderboard is measured collectively, John contribution in the task is less than the expected level. In the end, he won the 10% increase in his salary because he relied on his teammates to answer more calls and, as a result, his team became at the top of the Leaderboard. At the same time, he was holding the highest number of badges in the individual tasks. In fact, such scenario has a negative effect on the group coherence and introduces conflicts to the workplace.

A1: Mitigation Strategy: What and Side effect	A2: Mitigation Strategy: How and Why	A3: Timing and Duration	A3:Stakeholders
PEER RATING	(HOW) COLLABORATION	DEFINED UPFRONT	SUPERVISORS + MANAGERS
TRANSPARENCY - So EVERYONE CAN SEE WHO HAS DONE WHAT	TIME BASED REVIEW (REGULAR)	MANAGED AT RUN-TIME	FOR DESIGN DESIGNING SYSTEM
SELF ASSESSMENT	(WHY) PREVENTION MOTIVATION DETECTION	STAFF	STAFF
A COMBINATION OF BOTH WOULD HELP EVERYONE INVOLVING SUPERIORS MAY INDUCE STRESS, USING PEERS MEANS EVERYONE IS ON THE SAME PAGE.			

Page |281

1.2 Clustering groups

Dividing a group into intragroup

Situation/Reason:

This is a common risk which could occur in the teamwork place for different factors, e.g. performance feedback sent to the group, the transparency feature in the system.

Scenario:

Thomas sent his feedback which includes the winner of the badge for April. Also, a record of the number of badges each member is holding for the previous three months. Sophie and Alice won the highest number of badges from the first and second team, respectively. This makes Sophie and Alice close friends, sharing interest and always discussing ways to improve their work in pair as they are the top two winners. In such situation, this starts to shape intragroup in the workplace based on staff performance.

A1: Mitigation Strategy: What and Side effect	A2: Mitigation Strategy: How and Why	A3: Timing and Duration	A3:Stakeholders
RANDOM GROUPS	DIRECTIVE	MORE AT DESIGN STAGE	I.T. DESIGNERS
→ POSSIBLE LOWER MORALE	→ PREVENTING BAD GROUPS		STAFF
→ AS LONG AS REALLY RANDOM GROUPS, ALLEVIATES FEELINGS OF BEING PICKED ON FOR BEING EITHER GOOD OR BAD	→ ALLEVIATING FEELINGS OF BEING CRITICISED		
ROTATIONS SENSITIVITY → RISE TO BUSINESS - OVERALL → DISRUPTION TO WORKFLOW			

This section will present the materials used for the evaluation study discussed in Chapter **8**.

Part1: Participants consent form

Participant Agreement Form: (Validation study)
Full title of project: Designing Gamification for Business Workplace
Name, position and contact details of researcher:
Abdullah Algashami, PhD student, Bournemouth University
Email: aalgashami@bournemouth.ac.uk

Please Initial or Tick

	Here
I have read and understood the participant information sheet for the above research project	
I confirm that I have had the opportunity to ask questions.	
I understand that my participation is voluntary.	
I understand that I am free to withdraw up to the point where the data are processed and become anonymous, so my identity cannot be determined	
During the study I am free to withdraw without giving reason and without there being any negative consequences.	
Should I not wish to answer any particular question(s) I am free to decline.	
I give permission for members of the research team to have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the outputs that result from the research.	
I understand that the sessions will be audio-recorded so that it may later be transcribed and anonymised. I understand that once transcribing is completed the audio recording will be destroyed. I understand that the transcription will not include any information that could be used to personally identify myself or others.	
I understand that I am free to refuse recording the session, the researcher will be taking note instead.	
I agree to take part in the above research study.	

_____   _____
_____
Initials of Participant   Date   Signature
_____   _____
_____
Initials of Researcher   Date   Signature

Information Sheet

The title of the research project
Designing Gamification for Business Workplaces

Invitation

You are being invited to take part in this research project conducted by Abdullah Algashami, a research student in the Department of Computing and Informatics, Faculty of Science & Technology, Bournemouth University, UK. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. You will be asked to sign a participant agreement form and at the end of the session you will be given a copy of this information sheet and a copy of the signed participant agreement form.

What is the purpose of the project?

The aim of this research is to validate GAMR.IM method which meant to help for gamification risk identifaction and mitigation. I aim by conducting this study to explore the usability and validity of the proposed method to identify risk factors which might exist in a proposed case study and help to mitigate the identified risks in the work environment.

Why have I been chosen?

You have been chosen because of your background and expertise and reputation in the research, development and practice of gamification and its related area. The research team believe your feedback will be beneficial to consolidate the approach and mechanisms proposed in this project.

Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a participant agreement form. You can withdraw at any time, up to the point where the data are processed and become anonymous, so your identity cannot be determined, without it affecting any benefits that you are entitled to in any way. You do not have to give a reason. Deciding to take part or not will not adversely affect you.

What would taking part involve?

As a participant in this project, there will be some activities to undertake. Firstly, you will fill a short pre-selection survey to gather your demographic data and your experience with gamification elements. If based on the information you provide you are selected for the next stage of the project, you will be asked to take part in a study with four stages as explained in the follow:

- Stage one: Participants of the validation session particularly the system analysts and management will be asked to transfer the case study to models using DMML. Also, they will be asked to generate scenarios extracted from the models presenting specific situations of applying the gamification system into the work environment following some provided quality criteria. The scenarios are meant particularly to help participants to scope the focus of the method on special cases from the organisational model and start the identification and mitigation process.

- Stage Two: Participants (i.e. system analysts, managements and end-users) will be given the scenarios and the models and will be asked to evaluate the proposed design of the gamification system and try to specify the potential risks might occur in the workplace.

- Stage Three: Participants will be asked to re-evaluate the proposed design of the gamification system in the case study using GAMR.IM method.

- Stage Four: Participants will be asked to evaluate the usefulness of the materials used in GAMR.IM method and identify the weaknesses and strengths elements.

What are the advantages and possible disadvantages or risks of taking part?

Whilst there are no immediate benefits for those people participating in the project, it is hoped that this work will improve our understanding of the usage of gamification in workplace and how we improve the design that can help to maximise the acceptance of such technology and minimise side-effects.

How will my information be kept?

All the information that I collect during the course of the research will be kept strictly confidential. You will not be able to be identified in any reports or publications. All data relating to this study will be kept for 5 years on a BU password protected secure network.

Will I be recorded, and how will the recorded media be used?

Yes. The recording will help the research team to capture the information that will be sought from you during the interview or the focus group. However, you will be given the right to accept or reject the recording. No other use will be made of the recording without your written permission, and no one outside the research team will be allowed access to the original recordings. The audio recordings made during this research will be deleted once transcribed and anonymised. The transcription of the interviews will not include your name or any identifiable information. Instead, each person will be identified by their code (i.e. #id523741, #id523753, etc.).

Contact for further information

If you have any queries about this research please contact Abdullah Algashami by email on aalgashami@bournmeouth.ac.uk or by phone on 01202 961217 or by post to:
Abdullah ALgashami
Department of Computing & Informatics
Faculty of Science and Technology
Bournemouth University
BH12 5BB

Complaints

If you have any complaints about this project please contact Professor Tiantian Zhang, Deputy Dean for Research and Professional Practice of the Faculty of Science and Technology at Bournemouth University at the following address:
Professor Tiantian Zhang
Talbot Campus, Fern Barrow, Poole, BH12 5BB
E-mail: researchgovernance@bournemouth.ac.uk
Tel: 01202 965721

Thank you for taking the time to read this information sheet, and please do not hesitate to contact me if you have any queries.

Part 3: Participants incentive receipt

Bournemouth University

Receipt for participant compensation

This information will be used for financial audit and verification only. It will be kept confidential.

Participant name:	
Participant's signature:	
Phone number:	
1st line of address and post code:	
Date of payment:	
Amount of payment:	
Researcher's name:	

Part 4: Participants Demography

Participant Name or Code:
Age group: 20-30   31-40   41-50   51- 60   60-Over
Gender: Male   Female   Other

System analysts					Human Computer Interaction					Social Informatics					Digital Motivation					Behaviour change					Human Factors					Other:				
1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5

Please specify your familiarity with the topic as follow:

(1) Very Poor (2) Poor (3) Fair (4) Good (5) Very Good. These cells represent the 5-points Likert scale, and the dots show the participants' responses.

System analysts	Human Computer Interaction	Social Informatics	Digital Motivation	Behaviour change	Human Factors	Other:

Please specify your years of experiences of the above topics

If you have experiences with any other topics please specify them here using the same criteria of the scale in the table:

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GAMR.IM Evaluation Study Road Map

Documents	Step 1 / Activity 1	Participants
→ D1 & → D3, D2	**Models Creation**	- System analysts - Managements

Documents D3&D4	Step 2 / Activity 2	Participants
→	**Scenarios Generations**	- System analysts - Managements

Documents D5 / D6	Step 3 / Activity 3	Participants
→ →	**Risk Identification: Checklist Tool**	- System analysts - Managements - Subjective (staff) - Facilitator

Documents D6/ D7&D8	Step 4 / Activity 4 & 5 & 6	All Participate
→ →	**Risk Mitigation: Mapping**	

Documents D8 / D9	Step 5 / Activity 7	All Participate
→ →	**Risk Mitigation: Modalities of Application**	

D4: Scenarios Guidelines and quality criteria
➡ Used In: Activity 2

Guidelines and Quality Criteria
1#: Document the requirement specification. Creation of documents including different requirement exist in the system such as, document the project scope, groups, environment, agents in groups, stakeholders needs and services' needs.
2#: Identify the main actors in the system. This includes their goals, roles, responsibilities, aims and the tasks they are participating in.
3#: Describe behavioural related information. This includes tasks, events and obstacles. Some users behaviours in the system cannot easily captured thought the models (in the first step of the **GAMR.IM** method) so scenarios can be used to support the descriptions of behaviours for both users and the system itself.
4#: Present comprehensive set of relations. This includes the relation between actors, roles and task. For example, relation like dependency between goals, actors, and tasks should be clearly specified in the generated scenarios.
5#: Explain motives (rewards) and their related information. The motivation elements used in the organisational model should be clearly identified in the scenarios. This also including the reward nature used in the system, value and reward strategy.
6#: The shorter the better for writing the scenario sentences. This will help to not confusing the readers especially if they are normal users and will help them to understand the situation and provide their related requirements. Also, it is preferable to avoid using words like 'may', 'must', 'can', 'should' etc.
7#: The action or the activity in the scenario should be clearly described. This helps to avoid the ambiguity and vagueness in describing the situation. Either current actions in the system or predicted future actions such as, whether the goals can be achieved by the tasks or the dependency between actors not prevent them from

carrying out the task should be clearly describe.

8#: The more scenarios the better cover of potential gamification risks situations.

Ideally, it is difficult to decide when the adequate set of scenarios has been achieved. However, the **checklist tool** propose with the **GAMR.IM** method is a useful tool to act as a guide to decide whether the set of scenarios to cover all potential risk situations sufficient or still require more scenarios. The checklist consists of list of elements where the system analysts' team together with the managers and end-users should go through to ensure they cover all of the possible risk situations. This means the checklist tool in **step two** of **GAMR.IM** the next step will be used in parallel with the scenario generation step for better risk elicitation and identification process.

9#: Apply supportive tools and techniques when needed for better scenarios generations.

In some situations the scenarios cannot be easily generated for many reasons. For example, the end-users cannot express their requirements or needs from the system. In such situations, techniques like **storyboarding** and **role-plying** can help to speculate situations and create scenarios.

- **Storyboarding:** The main idea of this technique is to help participants i.e. users and managers to simulate the situations in graphical representations. This will help to walkthrough different situations and get feedbacks in order to support the creation of the scenarios and elicitation of their requirements.

- **Role-playing:** The main idea of role-playing is revolve around imagining and performing (Diaz et al 2009). Participants in the decision-making process i.e. end-users and management stakeholders can be asked to play specific roles they would carry out in the system. In this technique, different roles within the system are defined and briefly described. This containing also description of the tasks and goals the role would contain. These roles can be then played by the represented participants. A summary of requirements can be then listed in whiteboard. This would help for scenarios generation.

D5: Checklist tool and Sub-categories cards
➡️Used In: Activity 3

Category	Risk Item	If Not, consider risks in table 9
Personal and social	e. Are all of the management and subject stakeholders or their representatives involved in the decision-making session?	All
	f. Within the same team and the same gamified task, is the appropriate level of staff: [Skills/Capabilities/Experiences /Training/Age / Understanding /Involvement time in a team] fairly decided and grouped?	R5, R6, R7,R10,R1 1,R19,R20
	g. Are the goals of the management and subject stakeholders to be achieved from the gamified task well-defined and not conflicted?	R5,R7,R12, R13
	h. Do the management and subjects stakeholders involved in the decision-making session accept to commit to the session results, plans and actions?	All
Technical	h. For the gamified task, has the performance measurement style (automated or human-based) and scales been well-defined and specified?	R3, R4, R5
	i. Have the support services (hardware or software) needed to achieve the required goals of the gamified task been defined?	R8,R10
	j. Has the expected level of monitoring for the gamification element been well-defined and agreed?	R16,R17,R 19
	k. In the gamification element, has the level of transparency and autonomy been well-defined and specified?	R7,R8, R16, R19, R20
	l. Within the gamification element, has the data storage and accessibility techniques been well-defined and specified?	R16,R17
	m. Has the automated feedback mechanism been well-specified?	R3,R4,R5
	n. Does the nature of the gamification element coordinate with	R4,R13,R1

	the nature of the work environment?	4,R15
	o. Are the reward and punishment mechanisms around the gamified task well-defined and specified?	R13,R14,R 18R19
Task	d. Are the task and the developed gamification mechanism correlated in their natures (e.g. collaborative task with collaborative based gamification dynamics)?	R14,R15,R 19
	e. Has the task, measurement timing/ measurement frequency/ nature / resources been well-defined and specified?	R3
	f. Within the same gamified task, does the required level of: [performance/ cooperation/ competition] between the involved team members described and understood?	R1,R2,R4, R6,R7,R9, R13,R14,R 15,R19

Risks Symbol	Risk
R1	Free-Riding
R2	Meet the minimum requirements
R3	Performance Misjudgments
R4	Clustering groups
R5	Lowering self-esteem
R6	Counterproductive comparison
R7	Negative pressure
R8	Bias
R9	Bribe for exchange
R10	Work Intimidation
R11	Novelty effect
R12	Deviation from goal
R13	Lack of engagement
R14	Reduce the quality
R15	Social loafing
R16	Infringe autonomy
R17	Kill of the joy
R18	Exploitation
R19	Lack of group coherence

R20	Negative reinforcement

D6: Identified Risks

← Out Of: Activity 3
→ Used In: Activity 4

■ : The risk is in the **acceptable level** and the system tends to this level of risk e.g. stress in its normal level.

: Risks which cannot be avoided and required **mitigation strategy** to improve the validity of the system e.g. free riding or social loafing.

: Risks which has major effect and require changes in the proposed design itself e.g. competitive nature of a gamification system in collaborative environment.

Risk Factor								

Part 9: Document 7

D7: Mapping of MS and Risks
Out Of: Activity 4
Used In: Activity 5 & 6

Attribute	Management Strategies (MS)	(MS) Code
Setting up Agreements and Informing Participants	Commitment	MS 1
	Common ground rules	MS2
	Facilitator	MS3
	Voting	MS4
	Get everyone involved	MS5
	Norms	MS6
	Round robin	MS7
Checking and Reporting	Auditing	MS8
	Member checking	MS9
	Peer rating	MS10
	Random monitoring	MS11
	Self-assessment	MS12
	Storytelling	MS13
	External party	MS14
	Regular meeting	MS15
	Managerial level monitoring	MS16
	Transparency	MS17
	Anonymity	MS18
Appreciation and Controlling	Reward for helping others	MS19
	Acknowledgment of individual efforts	MS20
	Non-contentious bargaining	MS21
	Rotation sensitivity	MS22

Risk & Factor / MS					

Risk / MS							

<u>Description of Risks Management strategies on Gamification within Teamwork environment:</u>

-
- **Commitments:** from all of the participants. This strategy is based on the members' agreement and adoption of the choices and actions characterizing how gamification is going to operate.
- **Common ground rules:** This strategy is based on deriving and enforcing rules that articulate the set of acceptable behaviours in relation to gamification such

as, respect others, everyone has a say, no wright answers, privacy, and confidentiality.

- **Facilitator:** facilitating the design sessions of gamification, including running negotiation sessions, helping people to understand the common objectives of a group and assisting groups to set the common rules of conduct in an effective work environment supported by gamification.

- **Anonymity**: To give opinions or ratings of colleagues or managers in an anonymous way.

- **Voting:** to reach a decision in a facilitated session.

- **Norms:** on having a clear understanding of what the organisational culture is, e.g. normal social behaviours.

- **Transparency:** So everyone can knows every-things about others e.g. their performance in the task, their level in the motivation system etc.

- **Rotations sensitivity**: allocating people randomly within gamification system so that cliques and rivalries are not created.

- **Get everyone involved**: Encourage people in different roles to become involved in a discussion to decide behaviours and penalties for their gamification system.

- **Story telling:** To identify negative effect by asking people to present a situation in a story.

- **Round robin**: Pass the discussion between workers one by one to ensure everyone gives their ideas individually.

- **External party:** this strategy proposes to use an external authority or expert to check workers' performances and to resolve negative effects.

- **Non-contentious bargaining:** Encourages team members to control their emotions in a professional way, such as "counting to ten" before taking an action, writing down their concerns carefully in an email or letter with a calm manner.

- **Reward for helping others:** this strategy is related to prosocial theory, in which users can be rewarded for supporting others.

- **Acknowledgement of individual efforts:** in some gamification situations negative effect on teamwork might arise when individual efforts are not equal. So this strategy could help to inspire individuals to engage in group tasks to completion.

- **Auditing:** checking individual performances for example, give a quantity task and assuming people will respect the quality as well.

- **Member-checking**: this strategy utilises a sample member in order to analyse the eventual gamification result after finishing the task.

- **Random monitoring:** Keep workers ready all of the time as their performances might be monitored at any time.

- **Managerial level monitoring**: managers take the responsibility to check workers' performances in gamification workplace.

- **Peer rating:** this technique means that colleagues can rate each other's efforts and might be checked at any time to avoid a biased evaluation.

- **Self-assessment:** users assess their own performances, and this might be checked by managers at any time.

- **Regular meeting:** involving teamwork members in regular meetings, e.g. weekly, monthly or annually would help managers to remain updated with the current use of gamification system.

D8: Mapping of MS & Risks and Side effects
Out Of: Activity 5&6
Used In: Activity 7

| : The side-effect is in the **acceptable level** and the system tends to have this level of side-effect.
| : Side-effect which cannot be avoided and will be manages in the application strategy to improve the validity of the system.
| : Side-effects which have major effect and require better mitigation strategy.

Risk & MS / Side-effects								

The main side-effects identified in the study are related to (i) disrupting group coherence (ii) introducing unwanted stress and pressure (iii) adversely affecting competition and collaboration. The three cases are explained through the following points.

- **Transparency** as a management strategy might help to manage risks about staff performance in the system. However, it may introduce alternative risks such as <u>clustering staff</u> in the teams based on their level of performance. Moreover, it may add additional <u>unwanted stress</u> to staff by showing them their level of performance compared to others although they may have different timing and styles of concentrating their effort.

- **Peer-rating** as a management strategy might help to prevent risks about staff engagement in a task. However, it might have a negative effect on the <u>team coherence</u>. A participant suggested applying *anonymity* strategy together with *peer-rating* strategy to minimise the negative effect *peers-rating* strategy might cause to the team.

- **Anonymity** as a management strategy might help to manage risks introduced to the teamwork as a result of the *transparency* in manager's feedback of team individual performance, e.g. announcing, in a call centre, that top performers got between 95% and 99% positive customers rating without naming them while such anonymous announcement sets up the expectation and benchmark for the group. However, it might have negative effects on the right level of competition for staff that are only privately acknowledged for their performance.

D9: Modalities of application of MS
Out Of: Activity 7

Feature		Characteristics	Examples of (MS)
Purpose of Use	**Resolution**	- Making attractive offers - Exchange interests - Rewarding Agreements	- Reward for helping others - Reward for individual contribution - Non-continuous bargaining
	Alleviation	- Self-recognition - Unexpected intervention actions	- Random monitoring - Anonymity
	Prevention	- Specific objectives - Timeframe - Informed - Policy tools	- Common ground rules - Commitments - Voting
	Positivity Encouragement	- Appreciation - Rewarding - Recognition	- Acknowledgment of individual contribution - Reward for helping others
	Reduce Likelihood	- Regular modification - Random Checking - Regular monitoring updating	- Rotation sensitivity - Round robin - Random monitoring
Application Style	**Directive**	- Well- defined objectives measures - Clear application directions	- Regular meeting - Voting - Random monitoring
	Complementary	- Collecting agreements - Setting-up rules	- Round robin - Voting
	Moderated	- Complex Strategy - Difficult to steer the process - Difficult to reach consensus - External authority	- External party - Managerial level monitoring - Facilitator
	In parallel	- Linked to other strategy - Reduce negative effect	- Self-assessment & random monitoring - Anonymity & peer-rating
	Iterative	- Repeatable - Changeable - Regular checking	- Rotation sensitivity - Random monitoring - Regular meeting
Application Time	**One stage**	- Setting-up agreements - Informing - Structuring guidelines - Defining style	- Auditing - Peer-rating - Commitment
	Two stages	- Facilitating other strategy - Controlling the application of other strategy	- Transparency - Facilitator
	Continuous	- Continuous benefits - Controlling and managing	- External authority - Facilitator
	Planed in one stage and executed in other	- Require prior decisions - Require agreement on application style	- Rotation sensitivity - Peer-rating - Random monitoring

Modalities of Application			
Risk			Q1 Q2 Q6 Q8 Q3 Q2 Q1 Q7 Q2
Management Strategy			M1 M4 M4M8 M8 M4M8 M8 M4 M8
Side-effects			
Purpose of Use	Identify	Identify Limitation	
		Product Risk	
		Evaluation	
	Mitigate	Alleviation	
		Prevention	
		Predictive Engagement	
		Reduce Likelihood	
Application Style		Individually	
		Complementary	
		In Parallel	
		Iterative	
Application Time		One Stage	
		Two Stages	
		Continuous	
		Planned in One and Executed in another	
Stakeholders		Management	
		Subjects	
		Facilitator	
		Policy Makers	
		Gamification Developers	
		Business Analysis	
		Behaviour Change Specialists	
		Software Engineers	

MS \ Risk	R1	R15	R6	R13	R12	R9	R7	R2	R4
MS1	✓					✓			
MS2									
M3									
MS4									
MS 5	✓								
MS 6						✓			
MS 7	·								
MS 8	✓								
MS 9									
MS 10	✓			✓				✓	
MS 11		✓				✓		✓	
MS 12			✓						
MS 13									
MS 14									
MS 15									
MS 16				✓					
MS 17	✓	✓	✓						
MS 18									
MS 19									
MS 20		✓			✓		✓	✓	
MS 21									
MS 22				✓	✓	✓	✓		✓

D6: Identified Risks

↑ **Out Of: Activity 3**

↓ **Used In: Activity 4**

Legend:
- : The risk is in the acceptable level and the system tends to this level of risk e.g. stress in its normal level.
- : Risks which cannot be avoided and required mitigation strategy to improve the validity of the system e.g. free riding or social loafing.
- : Risks which has major effect and require changes in the proposed design itself e.g. competitive nature of a gamification system in collaborative environment.

Risk Factor	1-M	3/1	4/2	4/2	2/1	2/2	Technical D
R4, R9, R21							
R7, R12, R13							
R14, R19							
R17							
R3							
R1, R2, R8							
Risk acceptance criteria determinations							

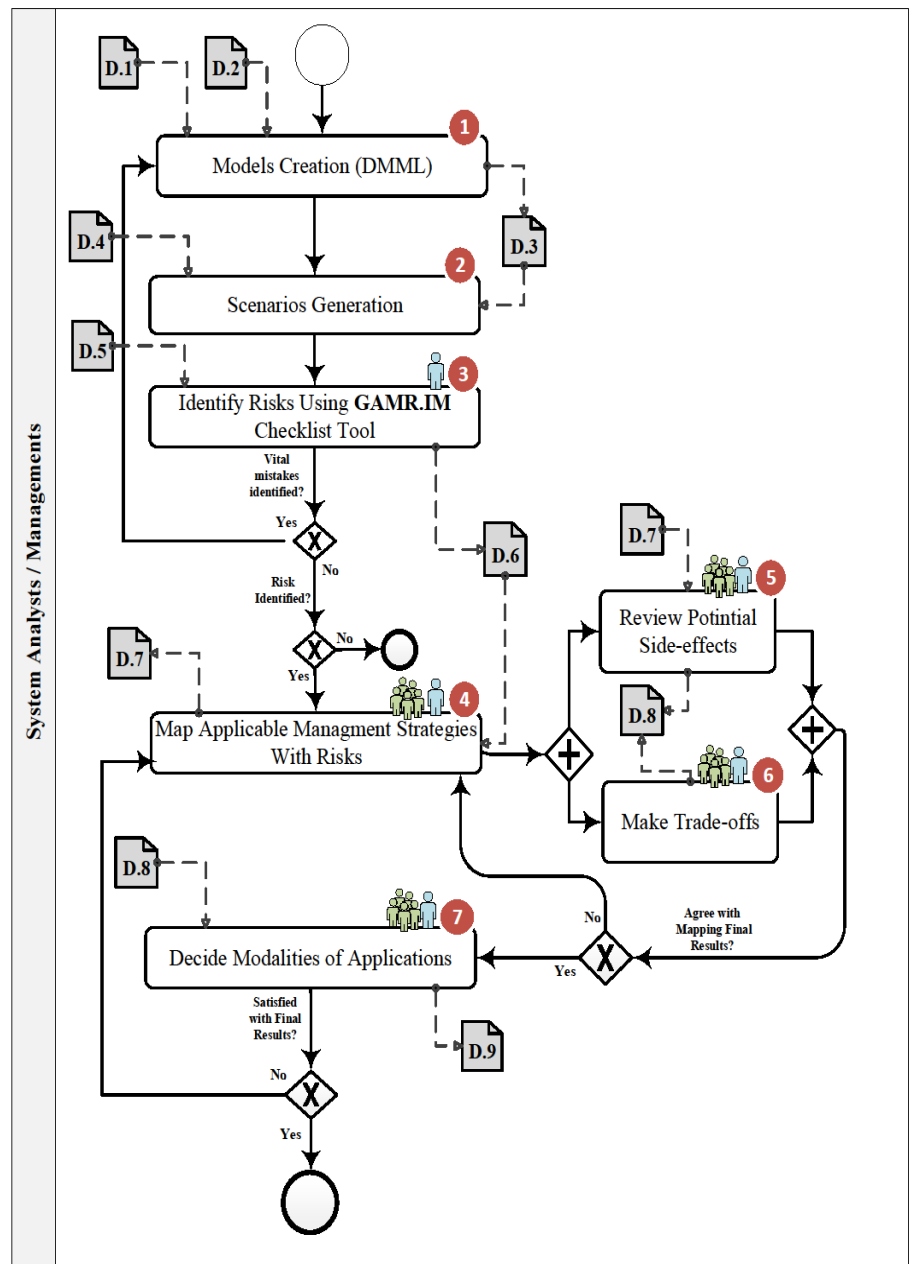**Part 13:** **During the session screenshots**
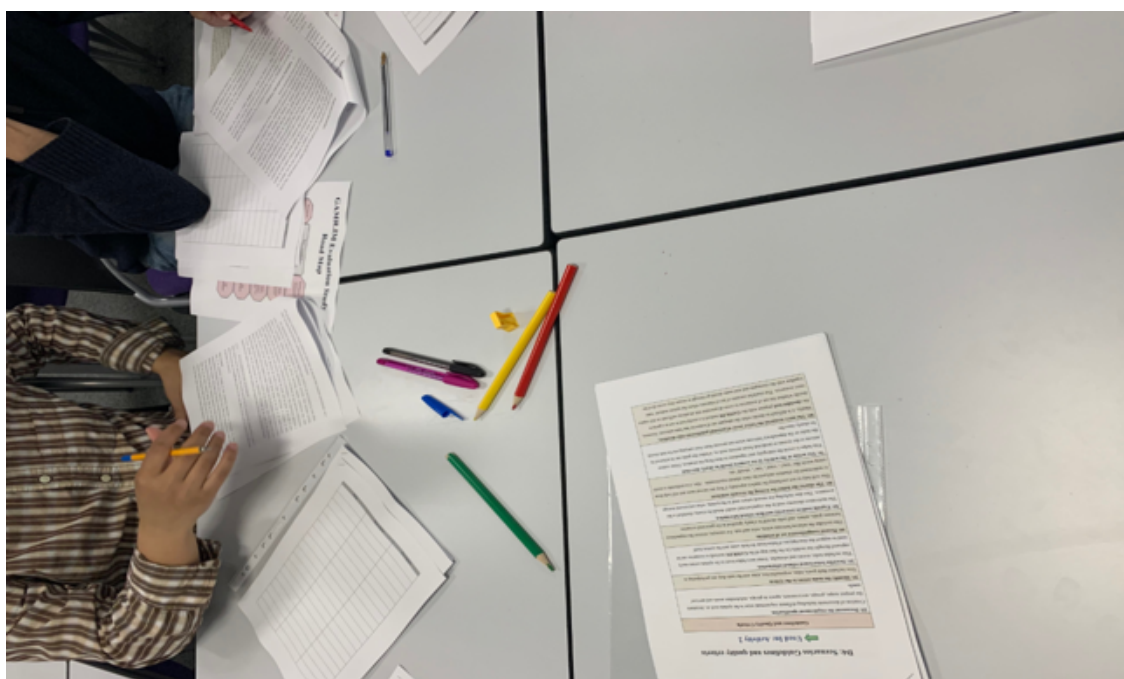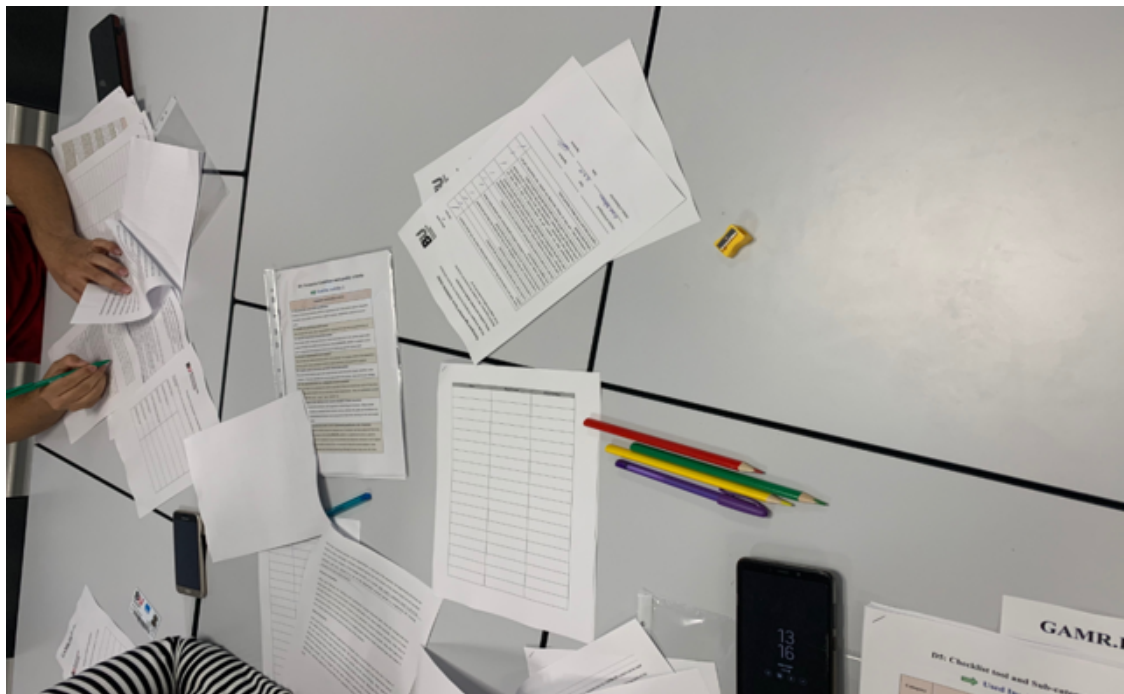
This appendix will present the method, the activity diagram and the materials before implementing the validation and propose the final versions.

Part 1: The method

<u>Part 2:</u> The activity diagram before the validation study

Part 3:

Modalities of Application

Category	Sub-category	Item						
		Risk						
		Management Strategy						
		Side-effects						
Purpose of Use	Identify	Limitation						
		Predict Risk						
	Mitigate	Resolution						
		Alleviation						
		Prevention						
		Positivity Encouragement						
		Reduce Likelihood						
Application Style		Individually						
		Complementary						
		In Parallel						
		Iterative						
Application Time		One Stage						
		Two Stages						
		Continuous						
		Planned in One and Executed in another						
Stakeholders		Management						
		Subjects						
		Facilitator						
		Policy Makers						
		Gamification Developers						
		Business Analysts						
		Behaviour Change Specialists						
		Software Engineers						

The Table is explaining the elements in Figure 11 and how the researcher has identified them.

Risk Factor	Source of risk	How it was identified
Performance Related Factors	Collectivism	Literature and confirmed through observation
	feedback	Observation and confirmed through interviews
	Transparency	Literature and confirmed through observation and interviews
	Dependency	Literature and confirmed through observation
Societal and Personal Related Factors	Societal Comparison	interviews and confirmed through observation
	Demographics	Literature and confirmed through observation and interviews
	Autonomy	Observation and confirmed through interviews
Goals Related Factors	Goal Assignment	Literature and confirmed through observation
	Commitment Level	Observation and confirmed through literature and interviews
	Conflict of Goals	Literature and confirmed through observation and interviews
Tasks Related Factors	Nature	Interviews and confirmed through

		observation
	Measurement	Interviews and confirmed through observation
	Resources	observation and confirmed through interviews
DM Element Related Factors	Monitoring	observation and confirmed through interviews and literature
	Reward System	observation and confirmed through interviews