

## GAMIFICATION FOR SERVITIZATION

Victor Guang Shi,  
Keith Ridgway  
James Baldwin, Rab Scott  
AMRC with Boeing,  
University of Sheffield  
guang.shi@sheffield.ac.uk

Panagiotis Petridis  
Serious Games Institute  
Coventry University  
Coventry  
ppetridis@cad.coventry.ac.uk

Tim Baines,  
Howard Lightfoot  
Aston Business School  
Aston University  
t.baines@aston.ac.uk

### ABSTRACT

The study described in this paper has set out to explore gamification from a servitization perspective to understand the opportunities and research challenges. A systematic literature review has been conducted to capture key characteristics of differing forms of gamification processes in a servitization context. The findings of our study focus on two areas: (1) structural, organization's physical bricks-and-mortar attribute and (2) infrastructural, policies and practices in how structural aspects of servitization are to be managed. Six key findings are presented and collectively these contribute to our understanding of the broader gamification technologies that can help to transform servitization. The contribution of our research is twofold. First it captures a set of theoretical framework for analysing gamification in servitization context. Second, it provides an in-depth roadmap in how gamification can be applied to target major challenges in servitization.

**Keywords:** Servitization, Gamification, Operations Management

### 1 INTRODUCTION

The Gaming industry is thriving. Gamers around the world are paying to have access to games for completing virtual tasks, purchasing virtual goods and gaining virtual capabilities. Developed on the fringes of contemporary gaming culture, applying gamification to the business world has gained increasing traction in a wide range of fields from education, marketing, computer programming to defence industry.

Gamification offers much potential to servitization. Gamification is a new business phenomenon, taking sophisticated game mechanics and applying those elements into a non-game context. Managers can apply gamification to engage and align user communities with their own needs by offering rewards and support tools that channel positive user innovations (Edery and Mollick, 2008).

The opportunities through gamification have yet to be fully realized. Despite hundreds of millions of gamers interacting with games on their commutes and at home, games remain an untapped opportunity for many businesses.

The purpose of this paper is to explore gamification from an servitization perspective to understand the opportunities and research challenges. We review the literature of gamification in an advanced service context, and through this present a framework that captures key characteristics of differing forms of gamification processes. Through this research, we have prepared a foundation that future research can use to expand the understanding of how gamification is applied in servitization.

## **2 Background**

People have been applying games for a very long time without fully realising the full scope and diversity of the concept. The ancient Roman empire introduced gladiatorial combat to inspire admiration of Rome's martial ethics and relieve aggression of ancient Romans (Shelton, 2013). During the Warring State Period of ancient China, Sun Bin an alleged decedent of Sun Tzu was using horse racing to teach military strategies to Chinese aristocracy at that time. Modern day professional sports coach use game concepts to motivate their players to carry out long hours of repetitive physically demanding practice in order to produce flawless techniques.

According to Werbach and Hunter (2012) the first use of gamifying online systems was as early as 1980 by Richard Bartle, a pioneer in multiplayer online games, who referred to gamification as "turning something not a game into a game". As an extension to capture the complexity of gamification, Werbach and Hunter (2012) define gamification as "The use of game elements and game-design techniques in non-game contexts".

Gamification design with clear rule, goals and immediate performance feedback describe both the reasons for which the player interacts and the method by which the player can solve problems in the game (Uren and Brewster, 2013). These game mechanics can enrich the 'flow' experience, which is a psychological space in which the player can be immersed in the present moment, without any distraction from the past and future (Mainemelis, 2001).

Clear goals are created through alignment of the player's capability and the level of interaction between the player and the game goals (Deci and Ryan, 2004). When one's skills are much greater than the level of the game, boredom and lack of motivation arise, and when the goal is too difficult, anxiety and frustration will inhibit engagement (Mainemelis, 2001).

Immediate performance feedback allows engagement of the activity for a longer period of time (Mainemelis, 2001). Gamification creates immediate performance feedback to the player through providing interactive information concerning the player's performance and indicates what goals have yet to be completed, which is often used in the form of a 'quest log' as is the case with massive multiplayer online role playing games (MMORG).

People seek out the flow experience in all walks of life, often without realizing it. This can range from people going into a coffee house to inspire creative work, to a professional sports players practicing purposefully in order to win a high tension game. The absorptive capacity of human brains, together with emotions, can react differently to a variety of information presented to them. Gamification creates the flow experience through digital media technologies with advanced support in the form of audio and imaging, allowing reduced anxiety and fun elements enabling a transition into a fully engaging experience (Mainemelis, 2001).

Gamification design relies heavily on human psychology theory and advanced information technologies. Managers can assemble gamification components flexibly in order to drive people's innate motivation and create conditions for a fully immersive 'flow' experience that can lead to many forms of operational benefits. The convergence of gamification with new technologies can drive change among industry, research and institutions to form new organisational structures in order to maximize their gains from these new technologies.

## **3 METHOD**

Gamification in operations management is being addressed by multiple research communities involving business management, computing, human psychology and many others. This systematic review seeks to map out diversity of intellectual domains both within and across these. The aim of this research is to provide a holistic and organizing lens for viewing the various knowledge contributions from multiple research communities addressing the leading thinking with gamification for operations management. To achieve this, our study has set out to address the following questions:

1. Where it has been applied?
2. What has been impact?
3. What are the opportunities?

Our research adopted the existing frameworks, such as those provided Baines and Lightfoot (2013a) are carefully targeted at particular aspects of operations management, to give a comprehensive method of assessing where gamification has been applied.

To address these questions we have followed the principles and process of systematic review methodology. Systematic review methodology provides a viable means to management research to synthesize and organize research findings from multiple studies.

#### **4 POSITION AND IMPACT OF GAMIFICATION IN ADVANCED SERVICES**

Our research design adopt advanced services framework in structural and infrastructural decision categories (Baines and Lightfoot, 2013a) to identify where gamification is being used against each category.

##### **4.1 Gamification and Information Technology**

In the industrial age, technology development and innovations are mostly top down, beginning with the use of professionals in government and business, then moving on to mass consumer markets. In today's world, technologies are often being developed for personal use first then move back to business and government (Shelton, 2013). This trend has shifted the competitive nature in many manufacturing business, from gaining cost advantage by offering product with efficient materials, designs, and manufacturing processes to higher level customer services with focus on total experience, which is driven by data embedded within product and services (Shelton, 2013).

Manufacturers express increased interests to transform themselves into advanced services, this has led changes to process and information technologies to be built around service delivery with focus on providing the manufacturer with visibility of their product as it is used by the customer (Baines and Lightfoot, 2013).

Operators incorrectly use machineries can result frequent service calls, companies can use advanced ICT technologies to capture information about the way in which the product is used and then use this to modify desired behaviour. Gamification is a powerful tool to accelerate and drive behavioural change, virtual currencies and leader board can be designed to trigger intrinsic drive and extrinsic rewards for responsible equipment use behaviour and immediate performance feedback allows early warning for any misconduct.

Gamification design can be realistic or fantasy (Lameras et al., 2013) to help advanced service operations to create better understanding of its customer needs and wants. Managers often find low employee awareness and inconsistent interpretation of customer requirements that inhibit their ability for a better interface with their customers. Gamification is used to facilitate better understanding of customer production processes (Laine, 2012). The game requires competing teams to seek optimal production processes as to how equipment provided by the company is used. According to Laine (2012) the key purpose of the game is to encourage participation to actively think about how they can help the customer do business more profitably, over the life time of the equipment in use.

The use of gamification with 3D virtual reality allows real time, media-rich and highly interactive collaboration between manufacturers and their customers (Kohler et al., 2009). For example, sales in the pharmaceutical industry are a unique process, salespeople must respond to the varying needs of different doctors to persuade them to adopt the practice of prescribing certain medications. Gamification in 3D virtual reality allows salespeople to practice their response in a variety of situations in virtual pharmaceutical sales (DesigningDigitally, 2012).

##### **4.2 Gamification and Processes**

Organizations often misbelieve if they invest in latest information technologies from off the shelf ERP systems, hire most expensive consultancy boutiques, and build up best in class manufacturing process technologies, they could drive product into market like speed of light. In reality, and their feet are constantly on the breaks. Introduce radical new product into market can potential make their existing process manufacturing technologies obsolete (Baines and Lightfoot, 2013b). Also, many high value

manufacturing and service industries, new products cannot be commercialized without breakthroughs in process technology (Christensen and Raynor, 2003).

The true value of information and process technologies are not just their physical aspect, the key ingredients in their recipe, are the intellectual capital embedded within them. Gamification can be an effective tool for enhancing learning and understanding of complex subject matter (Garris et al., 2002), it has the capability to bridge knowledge transfer of tacit and imitative manufacturing process know-how that reside in the heads of the scientists and engineers.

Different people are uniquely predisposed to different learning styles. This is because individuals have different ways of perceiving reality. People have constantly searched for ways to escape into a virtual world and current technology is an extension of this. Sometimes, safety and cost reasons can prohibit test and learning to be carried out in the real world, such as navigating a newly designed passenger airplane. Gamification offers cost efficient alternatives to teach employees essential information about the testing/ training context in virtual environment, allowing people to interact with the object, assess their performance and receive feedback to identify area of improvement (Shi et al., 2013).

In new product and processing development, testing is required to ensure that new products / services or its prototype function properly before it is commercialized. Gamification allows companies to test and learn in virtual reality before commit themselves before building physical prototype. Gamification can be designed to introduce lower fidelity virtual goods that would take years to develop and costly to produce into the real world, hand out copies to other users, analyse users' reaction to the prototype, and gain valuable insights for modifications (Kohler et al., 2009).

### **4.3 Gamification and Supply Chain**

Managers with responsibility for hundreds of product co-development programmes must assure critical technological intellectual properties are protected, which requires sophisticated coordination skills between new product design and manufacturing processes (Shi et al., 2012). Extensive outsourcing could endanger skills loss in project management and knowledge transfer that are common in vertical oriented organization (Hayes, 2005).

Gamification can make arguments about how business systems work and make claims about the world through procedural rhetoric (Bogost, 2008), which is the practice of effective persuasion and expression using processes. The player can interpret these processes and interpret the argument in their lives. For example, a flight simulator program attempts to model how the mechanical and professional procedure to aviation works. Unlike productivity software such as word processors and spread sheets, gamification creates an interactive virtual model allow players to explore through play (Bogost, 2008).

Real life businesses involve unintended consequences and complex interrelationships. Gamification can teach managers learn systems thinking, with a shift away from the “learning by listening” to “learning by doing” (Garris et al., 2002). Managers can make system decisions like a chess master, each move requires whole system thinking to attack or protect around strategic patterns, rather than tactical move on each individual piece. Gamification can simulate uncertainties of complex business interrelationships such as protection of intellectual property, process technology, R&D, and learning in an interactive virtual environment. This allows operations managers to learn any unintended consequences before making vertical integration or outsourcing decisions.

### **4.4 Gamification and Project Management**

Production operations traditionally focused on functional planning and control, by specialized group of expert within their own functional field, as result, solutions are mostly predictive and potentially conflicting with other functional goals. In product centric servitized operations planning and control systems encompass physical assets, maintenance and service processing, management tend to be structured in a joint manner between delivery arm and commercial arm and customer service groups (Baines and Lightfoot, 2013a). Generating solutions for delivering product availability and functional capability requires a rich mix of people contribute to the project ideas, involving cross functional groups within the company, suppliers, customers and even competitors (Hayes, 2005).

Project managers can use gamification to enable team collaboration, where complex technical issues can be solved by specialists in seemingly unrelated fields. Companies can take advantage of gamification by bring together large groups of bright people outside the walls of a company (Jeppesen, 2005). For example, the Foldit game helped to develop treatment for disease through capitalizing on people's spatial awareness and problem solving skills. Foldit uses games to represent complex protein structures. Differently configured protein might prove effective at neutralizing the HIV virus and the game goal is to score the greatest number of points by identifying the optimal shape of a protein (Baker, 2006).

#### **4.5 Gamification and Productivity**

Good managers inspire their employees to work extremely focused and productive, and in an ideal situation, work should be fun and engaging. The cost of disengagement can be enormous. In the United States disengagement cost was estimated about \$300 billion a year in lost productivity (Pink, 2010). Often manager merely focus on extrinsic financial compensation such as short term incentive plans and pay for performance schemes with less attention on intrinsic motivation such as rewards of recognition or the satisfaction of having made a positive contribution (Shelton, 2013). Intrinsic motivations are difficult to address because individual perceptions and their motivations are more complex and managers often lack effective tools to engage with individual employees.

By introducing game mechanics, gamification can encourage collaboration, encourage information sharing, reward contribution and improve employee morale where monetary incentive may not be necessary. When people are intrinsically motivated, they engage in the activity for inherent satisfaction, rather than to gain some outcome separated from the activity (Mainemelis, 2001). Workforces perform best when they are fully engaged. Time seems irrelevant to the activity and the energy of each individual is focused on present tasks with past and future issues not disturbing their status of mind.

#### **4.6 Gamification and Knowledge Management**

Increasing complexity of customer needs drive companies to adapt to satisfy varying customer needs. Cultural change requires right performance measures. In the old world communication was expensive, organizational structures were more likely to be hierarchical, where information seekers navigated around information hoarders to get data and knowledge they seek (Shelton, 2013), operations is generally measured against cost, specification and delivery on time (Baines and Lightfoot, 2013a). In contrast in the new world, where communication cost is near zero, a networked organization is formed to share information and knowledge with everyone (Shelton, 2013).

Gamification can help to develop a knowledge sharing culture. Use new information technologies that can move company culture away from core values of developing and hoarding valuable proprietary information, to sharing that information for the benefit of the entire industry (DesigningDigitally, 2012). Managers can use gamification to create fun and energizing workplace, goals and incentives that channel intrinsic motivation of each creative individual to develop desired skill set, involving relationship building, flexible, service centric, authentic, technically adept and resilient (Baines and Lightfoot, 2013).

### **5 CONCLUSION**

Our research indicates that the gamification can be applied with confidence to servitization. Total six areas of advanced services can benefit from gamification, involving, ICT technologies, processes, supply chains, project management, productivity and knowledge management.

Although much progress in gamification design, technologies and applications has been made in the recent years, gamification application in the servitization context is still in an exploratory stage. In contrast to the uptake of technology and management techniques in last century, the internet age, a rising population with high tech literacy and open sources on multiple technology platforms will increase the adoption of gamification at rapid pace. Gamification design can create interactive,

challenging, engaging and media rich environment to help many manufacturing and service operations.

However, to deliver gamification and gain acceptance in corporate world are challenging, many organizations may have low tolerance for radical technologies, managers may lack of experience and awareness to implement gamification technologies, game design can be difficult to both engaging and educational.

## ACKNOWLEDGMENTS

This work was supported by EPSRC Grants Ref EP/K014064/1, EP/K014072/1, EP/K014080/1 'Transforming the adoption of Product-Service Systems through innovations in applied gaming technology'; a joint project with Aston Business School, the Advanced Manufacturing Research Centre, University of Sheffield and the Serious Games Institute, Coventry University.

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