

Unlock Your Insight: Employing a Gamified App to Engage Manufacturers with Servitization

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Abstract

This paper discusses the creation and dissemination of the gamified software application Unlock Your Insight. The app is based on an original workshop activity designed to engage representatives from the manufacturing industry with research into servitization. Both the workshop activity and the app encourage participants and users to reflect upon their organization's competitive strategy; comparing their current and future visions in relation to the competitiveness of their product, price or package that they offer their customers. We argue that the gamification and digitalization of the activity allowed servitization research to be disseminated further and more quickly than previously possible.

Keywords: Servitization, Gamification, Dissemination, Strategy

Introduction

For business schools, typical methods of engaging manufacturers with servitization can include workshops, seminars and executive education. Digital technologies have the potential to extend the reach of these activities, as they are interactive and can be disseminated online. While digital simulations are well established as learning and teaching methods in the context of Business Studies and Operations Research (Robinson, 2008a, 2008b; van der Zee et al., 2012), gamified software applications, or 'apps', may be better suited to introducing manufacturers to the concept of servitization. This is because research into the process(es) of servitization is relatively undeveloped (Baines et al., 2017), and it is therefore difficult to model servitization realistically for simulation environments. Gamification, on the other hand, prioritises engaging designs over verifiable models, which could be exploited to engage manufacturers with servitization.

This hypothesis is based on both established and emerging theories of games and gamification. These theories state that games design principles can be employed to encourage participants to engage with certain contexts and/or processes (Deterding, 2012). This paper explores whether such principles can be employed to extend traditional engagement activities such as those listed above. In doing so, the paper discusses the creation and dissemination of the gamified software application Unlock Your Insight. The app is based on an original workshop activity, Servitization Bingo, designed to engage representatives from the manufacturing industry with research into servitization. Both the workshop activity and the app encourage participants and users to reflect upon their organization's competitive strategy; comparing their current and future visions in relation to the competitiveness of their product (quality), price, or package (services) that they offer their customers. We argue that the gamification and digitalization of the activity allowed our research to be disseminated further than previously possible.

Servitization Bingo

Servitization is the process of a business transforming from a product-oriented to service-oriented business model. In manufacturing contexts, servitization involves moving from selling products to offering service contracts; exploiting both production expertise and intelligence related to customers' operations. Interest in servitization has been steadily growing in recent years due to its potential advantages. Where a business operating through selling products is reliant upon the profits made from each unit sold, a servitized business profits from the revenue made through the contracts and relationships it maintains with its customers. This can help businesses forecast revenue, make them more resilient to competition, and offset the risk and/or uncertainty of fluctuating market and/or economic conditions (Baines and Lightfoot, 2013).

Yet, the growing body of work that stresses the potential for servitization within manufacturing contexts is undermined by a lack of transdisciplinary research incorporating industrial practitioners in the process of defining effective change (Baines et al., 2017). In the Advanced Services Group (ASG) at Aston University's Business School in the UK, engagement with stakeholders in both large and small enterprises is conducted to fill this knowledge gap. There are several examples of successful servitization, such as Rolls Royce's Power-by-the-Hour model, or Xerox's Managed Print Services (Baines and Lightfoot, 2013), which can be used to inspire manufacturers to undertake the process. However, these outcomes relate to specific contexts of servitization that not all manufacturers identify with, and different sized organizations require different approaches. In large enterprises, teams or staff may already be in place that are responsible for innovation, and have identified servitization as a potential strategy. Smaller organisations, on the other hand, are not necessarily aware of the meaning of servitization, let alone understand what the process entails.

One workshop activity conducted by ASG designed to relate servitization to various manufacturing contexts is entitled 'Servitization Bingo'. Servitization Bingo communicates servitization to participants through language related to strategy. The language used is derived from established models of operational strategy in manufacturing related to the competitiveness of the manufacturer's price, the quality of its product, and the package of services that it offers. These criteria are adapted from concepts such as Treacy's and Wiersema's typology of three strategies for customer value; product leadership, operational excellence, and customer intimacy (as discussed in Zacharias et al., 2016), aligned with those that distinguish between Cost, Price, Quality, Delivery, Flexibility, Market Differentiation and Environmental Dynamism in manufacturing contexts (Ward et al., 1998; Ward and Duray, 2000). For example, a

strategy that incorporates Environmental Dynamism and Flexibility would respond to the fluctuating tastes and preferences of customers (Ward and Duray, 2000), whereas customer intimacy would be central to a servitized strategy; potentially resulting in the manufacturer introducing change as the customer’s needs are better understood. For ASG, the simplified criteria of Product, Price and Package has been adapted from these models, as these criteria are more appropriate for workshop environments where the language used needs to be accessible.

The first step of Servitization Bingo involves participants selecting statements related to their current business strategy. These statements are arranged on a sheet of paper reminiscent of a bingo sheet, as shown in Figure 1. After selecting between 12-15 statements on this sheet, participants are asked to identify the number of statements they have selected related to Product, Price or Package using the guide depicted in Figure 2. By positioning this guide over the columns of statements, the criteria each statement relates to are revealed. In the second step the same exercise is repeated; the difference being that statements related to future business strategies are selected. Participants can then compare their current and future strategies with one another.

B I N G O

We frequently review our product portfolio	Our brand values embrace innovation and performance	We constantly seek to improve efficiency	Our brand values embrace cost and delivery	We are experts in our customer’s business	Our brand values embrace supporting our customer’s business
We know ‘what’s hot and what’s not’ for technology	Our products are expensive, but worth it	We know our cost drivers and work hard to keep these low	Our products last long enough	We know our customers well and regularly meet to discuss their needs	We are a critical part of our customer’s operations
We build the best product	Our company is recognised as a provider of leading products	We offer great prices and quality	Our company is recognised as a low cost provider	Taking away the customer’s pain is critical to our success	We provide the best total solution
Product technology and time-to-market is critical to our success	We are always on the lookout for new product ideas	Product price and delivery are critical to our success	We always try to achieve a low cost position on our products	We always try and be flexible for our customers	Our company is recognised for its service excellence
Our core processes focus on invention	Performance is our middle name	Our core processes focus on process improvement	Consistency is our middle name	Our core processes focus on solving the client’s broader problem	Experience is our middle name

Game 1: Mark those 12-15 statements that best describe your core business today

Figure 1 – ‘Servitization Bingo’ workshop activity sheet

<p>More stamps here? Then future competitive strategy based on ‘best product’</p>	<p>More stamps here? Then future competitive strategy based on ‘best price’</p>	<p>More stamps here? Then you are servitizing and we need to talk more!</p>
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No clear pattern: then try this analysis again but with a smaller chunk of your business

Figure 2 – Guide for participants to identify statements on the workshop activity sheet related to Product, Price and Package

Servitization Bingo forges a common lexicon of servitization amongst hosts and participants. Regardless of whether the manufacturer has expressed a bias towards a servitized offering, Servitization Bingo provides a channel through which some aspects

of servitization can be communicated. The results of servitization bingo are unpredictable, and it could be that practitioners indicate a preference for moving away from services in the future. Nevertheless, the act of identifying current and future strategies serves as a point of discussion; encouraging practitioners to thoughtfully consider their business strategy in the context of servitization. At the same time, the workshop activity provides manufacturers with the opportunity to reflect upon their current and future business strategies.

During a workshop hosted by ASG, a participating representative from Columbus Global UK identified that this activity had the potential to be disseminated further. It was observed that participants enjoyed engaging in the act of comparing results with one another; particularly those from within the same organizations. As a communication tool, the sheet of statements encouraged participants to explore any discrepancies in their selections, and discuss their organization's current and future strategies internally. From the hypothesis related to gamification and digital technologies described above, the research team at ASG anticipated that Servitization Bingo could be disseminated to industry through enhanced gamification and digitalization as an online tool. Columbus envisaged that such a tool could also be used for identifying potential partners to engage with, and agreed to collaborate with the research team on such a project. Unlock Your Insight was the outcome of this collaboration.

Unlock Your Insight

Unlock Your Insight followed a different creation process than that of Servitization Bingo, and reflected a more process-oriented approach. Research into gamification is in its infancy, having generated much academic interest since it was first defined as the process of implementing game design elements within non-game contexts (Deterding et al., 2011). As this research has progressed, the focus has shifted from the selection of elements to the process of making something more 'gameful' (Seaborn and Fels, 2015). Recent methods related to this process take into account the diversity of different kinds of users and their requirements, and are inspired by approaches such as game design (Deterding, 2015), persuasive design (Werbach, 2014), and design science (Cheong et al., 2013). While Servitization Bingo was being designed, the process could be described as being 'elemental' (Werbach, 2014), as the use of a bingo card and the process of selecting statements were elements associated with the game Bingo. The process behind Unlock Your Insight was broader; in keeping with more recent trends in gamification.

Gamification

The application of gamification in operations and servitization research is in its infancy. While concepts aligning theories of servitization and gamification are being explored (Shi et al., in press), a practical approach to employing gamification in operations has not yet been proposed. For the development of Unlock Your Insight, we used van der Zee et al.'s (2012) conceptual model of simulation and serious games for operational decision support as a basis. This was then aligned with a broader process more recently proposed for gamification; a method for 'gameful design' (Deterding, 2015). Following a review of the literature, these two approaches were deemed to be appropriate for three reasons. Firstly, the conceptual model for serious games and simulations provided by van der Zee et al. (2012) is the outcome of research within the context of operations, and is therefore relevant to the present context. Secondly, Deterding's (2015) method is the outcome of research into a range of approaches in the broader context of gamification research, and can be used as a reference point for developing gamification in operations. Thirdly, each approach involves the same number of steps, which can be easily cross-referenced to form

a hybrid approach for gamification in operations. While in-depth analysis and comparison of these models is beyond the scope of this paper, what follows is a brief description of the steps involved and how they relate to one another, followed by a discussion of their influence on the development of Unlock Your Insight.

Gameful Design

The five steps that Deterding (2015) proposes in his method are entitled 1) *Strategy*, 2) *Research*, 3) *Synthesis*, 4) *Ideation*, and 5) *Iterative Prototyping*. In the context of gameful design, *Strategy* relates to understanding the requirements of the outcome, users, and context, as well as any other constraints. In step 2, *Research* refers to users in the main, and understanding how their existing activities and behaviours relate to gameful design. *Synthesis* is the process of aligning *Strategy* and *Research* in the formulation of sequences that participants can engage in, recorded as clusters of activity, challenge and motivation. As the name implies, *Ideation* is the process of coming up with ideas for gameful design by associating the clusters defined in the *Synthesis* stage with game design patterns. *Iterative Prototyping* involves experimenting with these patterns through playtesting until a complete design is confirmed.

Simulations and Serious Games

In their conceptual model for simulations and serious games, van der Zee et al.'s (2012) steps are 1) *Understanding the learning environment*, 2) *Determine objectives*, 3) *Identify the model outputs*, 4) *Identify the model inputs*, and 5) *Determine model content*. *Understanding the learning environment* can be said to relate to Deterding's (2015) step *Strategy*, but from the more specific perspective of learning simulations and games. *Determine objectives* involves identifying the pedagogic goals of the simulation/game and aligning these with the attributes of the players. Stage 2 of van der Zee et al.'s model can therefore be said to combine elements of Stages 1 & 2 in Deterding's method. Stages 3 and 4 of van der Zee et al.'s approach relate to creating the model, which could be said to be more relevant to simulations than games. Nevertheless, models in this context are defined according to inputs and outputs, which relate to how the user interacts with and obtains feedback from the simulation. Therefore, these steps relate to the *Research* and *Synthesis* steps in Deterding's method. *Determining model content* is the equivalent of Deterding's (2015) *Ideation* and *Iterative Prototyping*, as it involves confirming the scope and detail of the model followed by its evaluation. Rather than employ iterative prototyping, however, van der Zee et al. (2012) propose evaluating the model through a list of predefined criteria.

Gamification for Operations

The similarities and differences between Deterding's (2015) and van der Zee et al.'s (2012) approaches reflect the perspectives of different disciplines. Whilst van der Zee et al. are concerned predominantly with the validity of models for simulation and learning, Deterding stresses the importance of exploring the requirements of participants. For the purposes of developing Unlock Your Insight, we adopted an approach inspired by these two: a method for Gamification in Operations (see Table 1). Here, the first step is to understand the requirements of the context and the relevant stakeholders in the activity, which can include funders and game creators, as well as participants. The second step is to research the current emotions, actions and/or behaviors of the potential participants in the gamified activity as a way of informing the requirements of the design. The third step is to define the intended emotions, actions and/or behaviors of the participants that follows the use of the gamification solution. Note that any stakeholder could have a

preference for the participants at this point, not just the participants themselves. The fourth and fifth step involve co-designing and co-creating the gamified solution; in keeping with the *Ideation, Iterative Prototyping*, and model development of Deterding (2015) and van der Zee et al. (2012).

Table 1: An approach to Gamification for Operations in relation to Gameful Design (Deterding, 2015) and Simulations and Serious Games (van der Zee et al., 2012)

Stage	Deterding (2015)	van der Zee et al. (2012)	Gamification for Operations
1	Strategy	Understanding the learning environment	Contextual and stakeholder requirements
2	Research	Determine Objectives	Participant's current emotions/actions/behaviors
3	Synthesis	Identify the model outputs	Participant's intended emotions/actions/behaviors
4	Ideation	Identify the model inputs	Co-design
5	Iterative Prototyping	Determine model content	Co-creation

Creation of the App

As Servitization Bingo had already been created and disseminated, there was a foundation of information readily available. Initial expectations were that gamifying this activity further would in effect result in a digital adaptation of Servitization Bingo. However, the process of redesigning the experience for digital gamification resulted in a different concept. The following is an overview of the creation process that lead to this concept.

Stage one involved identifying the contextual and stakeholder requirements. In brief, the context was the dissemination of information related to servitization, and the stakeholders identified were Columbus, ASG, the developer of the software Eyesparks, and C-level manufacturers. Columbus' interests were aligned with those of ASG's, as the usage of the app would need to increase awareness of servitization and inform both the research team and Columbus about potential collaborators. As a stakeholder, the developer Eyesparks needed the relevant information and input from other stakeholders in order to deliver the app to budget. In addition, the design of the gamified app needed to be accessible and responsive (i.e. possible to use on mobile and tablet devices) for Eyesparks to be able to produce it. As will be shown, this aspect instigated a significant change in the concept for the app.

The current emotions, actions and behaviors of participants had been noted by both Columbus and ASG when participants had used Servitization Bingo previously, as described above. Initially, there was little to differentiate the current attributes from the intended outcomes of using the digital version, other than for these attributes to be extended further. However, aligning these preferred outcomes with the needs of various stakeholders was influential during the co-design phase.

This phase was conducted during a group co-design activity between ASG, Columbus and Eyesparks. Having participated in Servitization Bingo previously, Columbus represented potential users in the activity. Initially, discussions centered around porting Servitization Bingo to digital devices. Once it was acknowledged that the sheet of statements depicted in Figure 1 would not be suitable for a range of devices, it was difficult for the group to ideate around the bingo concept. Instead, the sequence was broken down into a series of actions and outcomes related to selecting statements. Each statement is selected individually, though in the case of Servitization Bingo these selections occur while all the remaining statements can be seen. This was not possible in

the digital version, and so a system was devised in which each statement could be selected as part of a small cluster of statements. The established categories of Product, Price and Package from Servitization Bingo meant that the statements could easily be clustered in groups of three. Once the user had repeated the process of selecting from each cluster of statements, the relevance of their selections would be revealed to them.

Gamification of these actions was needed to motivate the user through the clusters of statements. A gameful design process may have involved making these actions less repetitive and focusing upon each individual selection. However, in our approach, understanding the needs of different stakeholders included being able to deliver the project on time and to budget. Creating a different kind of interaction for the selection of each individual statement would have cost resources that could have negated the potential benefits of doing so. The alternative approach we adopted was to form feedback mechanisms around these interactions, and identify a scenario that would motivate participants to progress.

Unlock Your Insight was the outcome of following this process. As illustrated in Figure 3, the premise of Unlock Your Insight is that the user needs to unlock a safe to reveal their competitive strategy. The combination lock of the safe combines the activities of statement selection with design considerations for mobile devices; encouraging users to continue through the statements by using rotating dials and lights to indicate progression (see Figure 4). This progression is rewarded through visual feedback of responses (see Figure 5) and an emailed report of the results. Though other scenarios were considered that contained a similar sequence, such as opening a treasure chest on a sunken ship, opening a safe was considered more appropriate for our target users, and the feedback mechanisms could be more easily associated with the dials on a safe.



Figure 3 – Unlock Your Insight title screen



Figure 4 – Unlock Your Insight combination lock

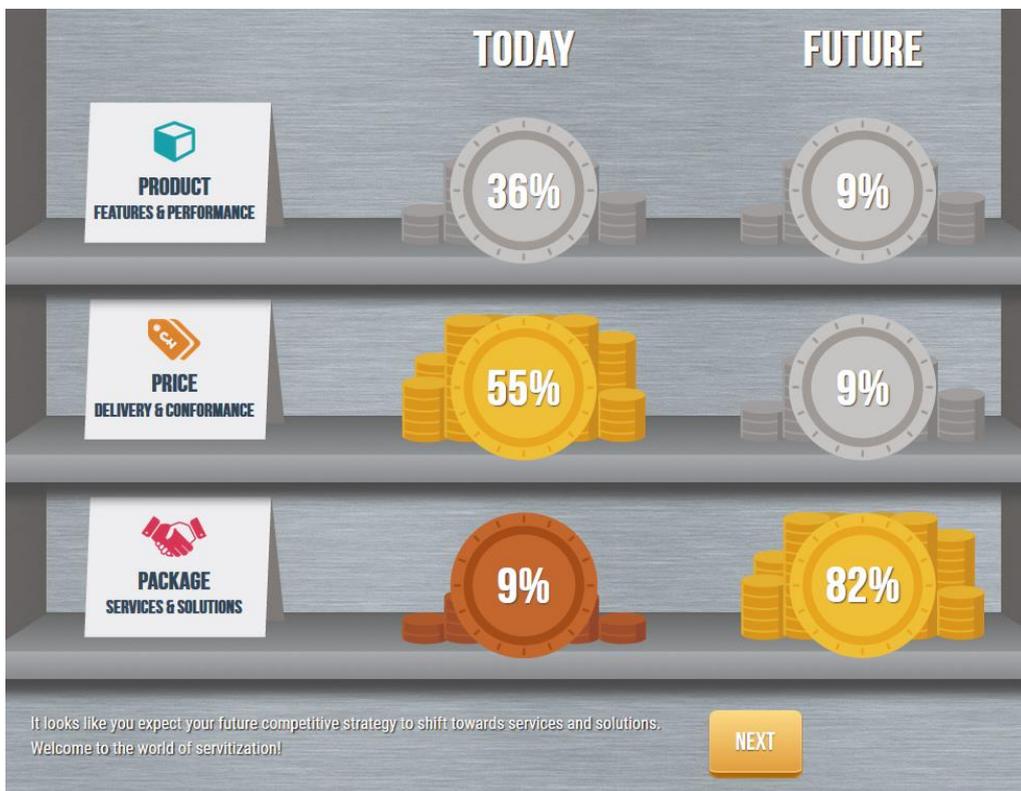


Figure 5 – Results hidden in the safe

The app was developed by Eyesparks, and a co-creation process similar to the *Iterative Prototyping* step as proposed by Deterding (2015) was followed during both design and development. Having determined most of the issues during the design phase, where testing with paper prototypes was done, the majority of issues encountered during co-creation related to usability. As stakeholders, Eyesparks were conscious of the need for clarity in the visualization of, and interaction with, information, which meant that ASG had to contribute small amounts of additional content in the process. An example of this is the description underneath the titles of Product, Price and Package and the summary text at the bottom of Figure 5.

Dissemination

Unlock Your Insight is designed to be used both remotely and in workshop environments. We have noted several advantages to Unlock Your Insight in relation to Servitization Bingo regarding the dissemination of servitization-related research. The digital application can be easily disseminated by all stakeholders, not just Columbus or ASG. In the co-design stage, it was recognised that encouraging participants to compare and discuss their results was a key aspect of Servitization Bingo that would need to be designed into Unlock Your Insight. The app provides participants with the opportunity to forward a link to their colleagues from within the app itself, without sharing their results. This allows participants to choose whether to compare results with colleagues after access to the tool has been shared, without compromising their privacy. In addition, the information given to participants regarding their results is clear due to the digital technologies used. In workshop environments, it is difficult to provide a breakdown of Servitization Bingo to individuals due to the range of participants. With Unlock Your Insight, reports are automatically generated and sent to participants. Each report provides an overview of the participant's results (see Figure 6) as well as a breakdown of how the different statements relate to Product, Price and Package. In this way, participants are shown the relevance of servitization in relation to their understanding of their organization's competitive strategy, whilst being provided with an artefact that they can refer to and build from in the future.

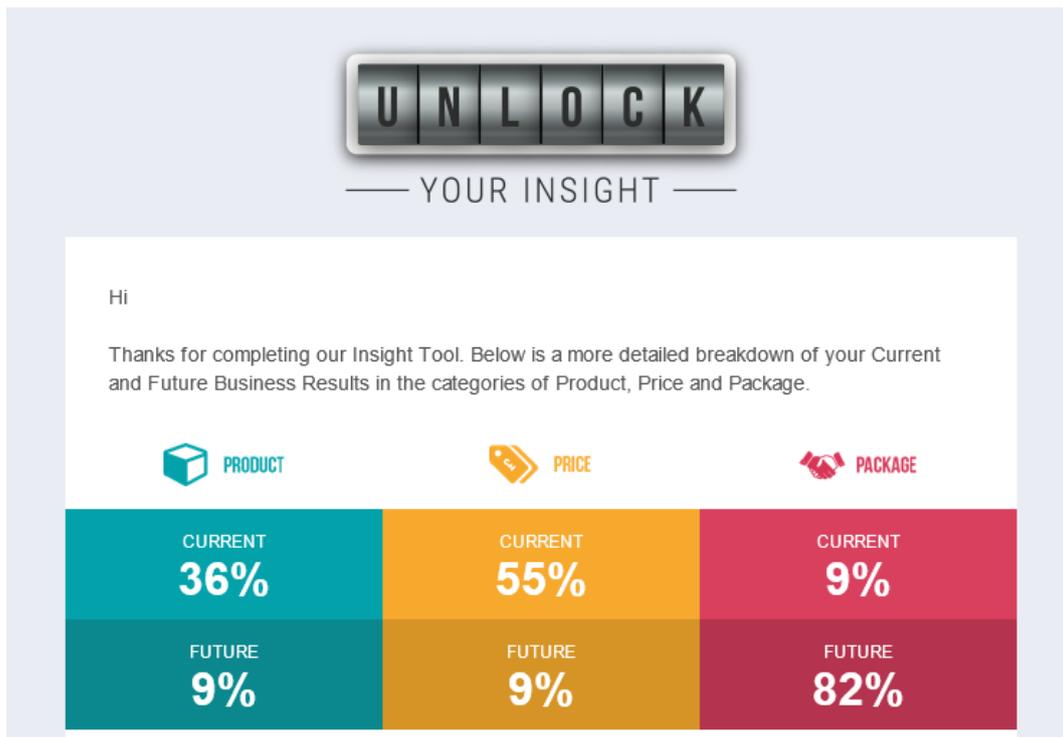


Figure 6: Example report sent to users of Unlock Your Insight

Unlock Your Insight captures data entered by users, allowing the research team to identify the kinds of organizations users belong to and the general patterns of their results. It is apparent from these data that a wider range and larger number of users have engaged with Unlock Your Insight than would have participated in workshops alone during an equivalent period. The data have been used to inform subsequent engagement strategies and relationships with industry, whilst providing ASG with a discussion point for future industrial collaborations.

Conclusion

The creation of gamified applications can benefit a range of stakeholders in academia and industry. The results of creating and disseminating Unlock Your Insight will inform future research into the use of gamification and digital technologies to disseminate research and engage manufacturers with servitization. The data provided by the app demonstrate that digital technologies have the potential to reach more users over shorter periods than traditional methods of engagement. The intelligence that can be gathered with such technologies over these periods can subsequently be used to form strategies for researchers to facilitate the adoption of servitization amongst various manufacturers.

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Appendix

To access the research data/software supporting this publication, see <http://doi.org/10.17036/researchdata.aston.ac.uk.00000200>

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