7th European Conference on Industrial Engineering and Operations Management
Augsburg, Germany, July 16-18, 2024
Publisher: IEOM Society International, USA DOI: 10.46254/EU07.20240060
Published: July 16, 2024

Utilization of Gamification to Motivate the Adoption Of Simulation Services In An Insurance Company, A Case Study

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Abstract

In 2021, an insurance company implemented a gamification strategy to enhance the adoption of simulation services. Gamification, as highlighted by Desai & Nagaraju (2018), aims to boost motivation, productivity, and employee engagement. This strategy combined design science research and game design methodology to promote awareness and encourage the use of simulation services for decision-making. Using a conceptual game model developed in Simio, employees engaged in a simulation game where they competed to achieve the highest score by controlling variables like resources and overtime allocation. This competitive approach effectively demonstrated the benefits of simulation services. The strategy resulted in a notable increase in demand for simulation services, with a 92.3% rise from 2020 to 2021, as indicated by archival data analysis. Additionally, the reach of the service expanded, with seven departments requesting simulation services in 2021 compared to five in 2020.

Keywords
Gamification, Motivation, Simulation and Design Science Research.

1. Introduction
An insurance company in South Africa established a business process improvement department in 2016 to enhance efficiency. Among its services, the department offers process simulation to analyse and improve workflows. Despite its inception in 2016, the simulation service was underutilized. To boost its adoption, a gamification strategy was implemented in 2021. This involved creating an interactive simulation game with elements like points, leaderboards, and winning states, allowing employees to compete and make decisions affecting system performance metrics. This approach significantly increased demand for simulation services, as evidenced by a comparison of completed simulation models in 2021 versus previous years.

1.1 Objectives
This case study aims to investigate and document the factors that contributed to the success of the implementation of the gamification of the simulation services within the insurance company. The case study combines the work of gamification theory, motivation theory, design science research and simulation modelling by answering the following questions:

- How did the gamification strategy affect the number of simulation model requests received during 2021?
- Did the gamification strategy impact the reach of simulation within the insurance company?

2. Literature Review
The following section contains an academic scientific and management practice literature review of gamification theory, motivation theory, design science research, and process simulation.

2.1. Gamification Theory Definition

"Gamification" was first coined by the digital media industry and is a growing trend gaining interest from many organisations and scholars. The term found more widespread adoption in 2011. Deterding, Dixon, Khaled, & Nacke (2011) identified gamification as: *"The use of game design elements in non-game contexts".* The breakdown of the elements within the definition as stated above can be simplified by saying that gamification is not a complete game but uses elements of gaming in a purposefully outlined plan, outside of the typical gaming context of entertainment, to ultimately influence the "players" to either increase participation within a system or impact certain behaviours (Deterding, Dixon, Khaled, & Nacke, 2011).

Werbach and Hunter (2012) identified that the important part is learning that people love to play games and that they are powerful tools used to increase engagement and create motivation. The relevance for organisations generally is that it will generate greater engagement around their products. This may, therefore, be very valuable in product development and value creation for technology and financial organisations.

2.1.1. Gamification From A Service Marketing Perspective

A gamified product or service generally uses a gamification approach to increase or enhance interaction with the service, the client and, indirectly, the company or organisation. Although most gamification applications are associated with digital services, this is not a requisite. The range of applications of gamification techniques has grown over the past few years (Brunello & Accademico, 2013). Research has been focussed on the impact of these techniques within business functions. These include motivation within an HR context, internal organisation and emotions that occur while using a gamified product. Detering's definitions of gamification are of value to this study.

2.1.2. The Business Value of Gamification

Desai and Nagaraju (2018) highlight gamification's value for a company that adopts that practice. The business value of gamification includes increasing individual motivation, improving productivity, fostering creativity of employees, strengthening internal communication processes, facilitating employee engagement, introducing innovative dynamics, developing specific skills and transmitting the corporate image.

2.1.3. Gamification Methodology

Fundamentally, gamification methodology encompasses gaming aspects that constitute the gamification system and, as such, are necessary for its creation and development. Werbach and Hunter (2012) define three distinct game design aspect in gamification: dynamics, mechanics, and components. Figure 1 shows the hierarchy of the elements in a pyramid shape.

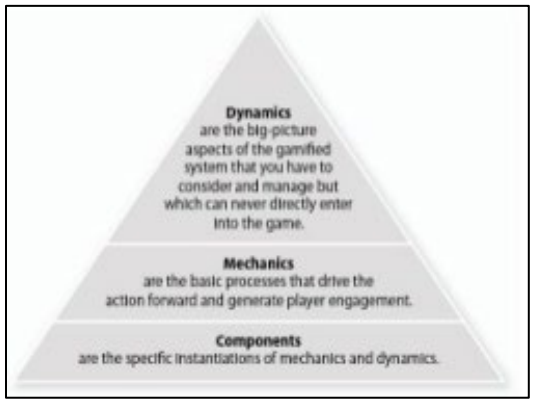

Figure 1. The Game Element Hierarchy Werbach & Hunter (2012)

Dynamics

According to Werbach and Hunter (2012), dynamics (game dynamics) are the large-scale characteristics of a gamified system that should be recognised but may not be a part of the game. Desirable dynamics require moving in the

appropriate direction by employing suitable practices; similarly, workers must be pushed to do required tasks. Werbach & Hunter (2012) suggest considering restrictions or constraints, emotions, a narrative, progression and interpersonal connections or social interactions.

Mechanics

Game mechanics are the activities that keep a player involved in the process. One or more of the dynamics can be produced by utilising game mechanisms. Using game mechanics may impact the emotions of gamification system users, such as improving their level of job engagement and igniting their interest in what they are doing. Werbach and Hunter (2012) suggest, among other things, a challenge, an element of chance, rivalry, cooperative effort, feedback sessions and rewards or benefits.

Components

Components are the lowest-level game components, and they are connected to higher-level game elements, such as mechanics. Some of the game components that Werbach and Hunter (2012) suggest are: the accomplishment of a goal or aim, an avatar (an image associated with a person's personality), a badge – a visible symbol of accomplishment, a leaderboard (visual display of progression and achievement), levels (a defined milestone progression) and points.

2.3. Motivation

Motivational theorists and researchers have studied what motivates people to perform in a particular manner (Encyclopedia.com: 2023; Eccles, Wigfield, & Schiefele, 1998; Weiner, 2000). Motivation is the interaction of multiple factors influencing human behaviour and behaviours in a particular situation or function (individual motives). These reasons are complex and vary from person to person; the organisation must align them with its requirements and goals in a commercial environment. (Friedrichs, 2011).

A strong interest in motivation is relatively straightforward to explain. When people are driven to execute a job, they perform better and pay greater attention to the duties at hand. Consequently, it is essential to encourage an individual and pique his interest in doing job responsibilities in a manner that helps the company achieve its goals most efficiently. Better performance, in turn, leads to improved job outcomes. On the other hand, a lack of motivation leads people to commit less time and energy to their jobs, struggle to advance professionally and achieve their objectives, and underperform. Thus, motivation is connected to goal achievement, job performance, and countless other concepts (Eccles, Wigfield, & Schiefele, 1998). Unsurprisingly, firms worldwide are continually pondering strategies to drive their employees to produce outstanding results.

2.3.1. Intrinsic and Extrinsic Motivation

The type of motivator — intrinsic or extrinsic — is one of the most fundamental but significant distinctions in motivation. Extrinsic motivation is offered via external motivating approaches, whereas intrinsic motivation refers to interior motives (Ryan & Deci, 2000). Extrinsic motivators might be monetary or immaterial rewards or a cause (a goal). Typically, in this case, individuals are motivated to perform an activity to get a reward or accomplish a goal. However, the work itself is neither inherently engaging nor entirely dull. (Ryan & Deci, 2000). Intrinsic motivation, on the other hand, suggests that the activity is satisfying in and of itself or, to put it another way, that neither a reward nor a goal is required to enjoy the work (Chou, 2021).

According to Kumar and Herger (2013), extrinsic motivation is the most effective while performing simple activities. However, extrinsic motivation is no longer beneficial if accomplishing the activity requires much thought or creativity. Moreover, elements that were effective in the past may become demotivators. Therefore, intrinsic motivation is preferred for solving complex problems. Extrinsic motivators, on the other hand, are more effective at sustaining a person's focus on a repetitive routine task. Once extrinsic motivators are withdrawn from the motivational system, a person's motivation is likely to fall to even lower levels than before the implementation of extrinsic motivators (Chou, 2021).

2.4. Design Science Research

Design Science Research is a methodology developed to reconcile design activity with research activity (Stapleton, 2005). Stapleton (2005) considered aspects of game design, design research and Fourth-Generation Evaluation – action research/constructivism to marry these concepts.

2.4.1. Game Design

Game design is a non-specific, often vague term that does not seem to have an agreed-upon definition, as there seems to be no universally defined game design process (Falstein, 2006). Salen and Zimmerman (2003) attempted and provided a working definition, which states: "Game design is the process by which a game designer creates a game to be encountered by a player from which meaningful play emerges" (Salen & Zimmerman, 2003). Ian Schreiber and Brenda Braithwaite (2008) say in their book "Challenges for Game Designers" that "game design is the creation of the rules and content of a game".

The method of game design is not mechanical but rather a rapid iterative cycle of prototype building, testing, audience scrutinising and redesign (Schrage, 1996).

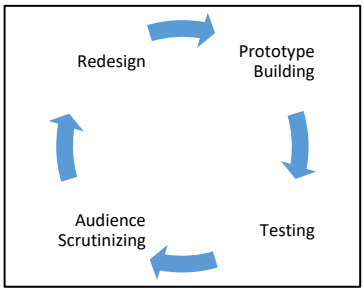

Figure 2. Game Design Cycle (Schrage, 1996)

Figure 2 shows the iterative cycle of prototype building (Schrage, 1996). The process starts with building a prototype, testing it, having it scrutinised by a test audience, and then redesigning it based on the feedback from the test audience. Understanding the design process necessitates the creation of a methodology with a variety of practices and procedures that may be used within the context of the investigated issue, as opposed to a single deterministic research method. The game design methodology featured in Figure 2 shares similarities with agile product development (McMahon, 2023), an engineering management tool used in production management.

As Rollings & Adams (2003) state, "Designing games is a craft as a game contains both artistic and functional elements". It would be required that the research method into game design would also include knowledge domains spanning science and the arts. Another aspect of game design methodology must consider tacit and informal knowledge and dreams: "Many game ideas begin as dreams" (Rollings & Adams, 2003).

2.4.2. Design as Research

Recognising that game design is a complex activity requires understanding how to explain the process. Early design research attempts suggested a scientific approach to understanding this issue. However, design research is less quantitative than scientific research, and other interpretative research approaches are found to be a more effective tool for evaluating human behaviour and sensibilities (Swann, 1999). Interpretive researchers focus on the naturalistic perspective and interpretive understanding of human experience (Denzin & Lincoln, 2005). They also adopt a variety of methods which span social and physical sciences and humanities, which can be combined within a single project (Denzin & Lincoln, 2005). At the same time, qualitative research provides an approach to investigating the art of game design, including artistic and scientific aspects.

The design process follows an iterative, cyclical decision sequence of problem, analysis, synthesis, and evaluation with a fluid / non-firm route (Lawson, 2006). The design differs from research as it is more concerned with synthesis – when a holistic solution is made for all the problem parts – while science is focused on analysis (Simon, 1996). Design is inherently focused on generating solutions through synthesis, unlike the scientific perspective of solving problems through analysis. Another perspective on the differences between design and science is that the solution-oriented design strategy relies on non-verbal, holistic, and visual thinking. In contrast, scientific research relies on reasoning and deduction (Swann, 1999). Design, inherently, lies beyond empirical scientific research as it uses tacit knowledge, intuition, and creative insights.

Design as a problem-solving activity that blends pieces into a cohesive whole generates the perception that the design process is also a research process (Swann, 1999). "*The action of designing is the same moment of synthesis that occurs in all forms of research (serendipity, as many social science researchers call it) and in design, this synthesis may be expressed as visual spatial knowledge in action"* (Swann, 1999). From this perspective, design as a research process focuses on action, which combines this concept with an action research approach. Action research is the parallel pursuit of change (action) and knowledge (research or understanding) (Dick, 1995).

The following criteria for action research must be met (Swann, 1999):

1. The subject matter is (usually) located inside a social practice that demands modification.
2. It demands participation in which researchers collaborate equally.
3. The project follows a cycle of planning, acting, observing, and reflecting in a systematic and well-documented investigation.

Comparing action research with design activities reveals surprising similarities. Both design activity and action research may be seen as acts to alter social reality, and designers create actions to improve undesirable conditions (Simon, 1996), while action research is "normally situated in a social practice that needs to be changed" (Swann, 1999).

Both concepts have cyclical approaches:

- Design: problem–analysis–synthesis–evaluation cycle.
- Action research: plan–act–observe–reflect cycle.

To examine the art of game creation, action research might potentially mix qualitative and quantitative methodologies. These parallels between action research and design activity demonstrate that some phrase adjustment would be required to make action research suitable for design.

However, the second and third action research conditions are not as well linked with design (emancipatory participation and systemic reflection) (Swann, 1999). Therefore, to develop a methodology for design means that these conditions must also be adopted (Swann, 1999):

- The users of design must be genuine collaborators and
- Public accountability and visible self-evaluation through "system and documented study".

2.4.3. Fourth Generation Evaluation

Stapleton (2005) believes that Fourth Generation Evaluation, an action research approach (with constructivist underpinnings), might be responsible for the outstanding criteria. Constructivism is an approach to learning where learners actively build knowledge based on previous experiences and world knowledge (Piaget, 1970). Fourth Generation Evaluation is a qualitative action research methodology constructed from the claims and issues of the stakeholder participants (Guba, Lincoln, & Lincoln, 1989). A constructivist review adopts a hermeneutic approach with a continuous dialectic iterative cycle of analysis, critique, reiteration, and reanalysis, leading to a joint case construction (Guba, Lincoln, & Lincoln, 1989).

Constructivists explore the created realities of the participants within the context of the study and join them with tacit knowledge (such as dreams, insights, and intuitions) to form a consensus. Dialogue pushes the research further with hermeneutic dialectics, which allows the comparison and contrasts of the different views of the participants.
Further, the constructivist researcher must adopt the following:

1. a naturalistic context,
2. the inclusion of tacit knowledge,
3. the human as the instrument of inquiry and
4. using qualitative methods (Guba, Lincoln, & Lincoln, 1989).

The research can commence once these conditions are met. Participants/respondents from which one can learn the most are selected (purposive sampling) to enter the hermeneutic dialectic circle (Merriam, 1991).

A single joint version of reality is constructed through the dialectic process, where the participants' views are collected and compared. The united representation of reality varies from the reality of everyone. The study design is emergent because, as the process progresses, the researcher constantly refines the design and assists in its

development until agreement is reached. However, the agreement does not signify the research's conclusion but provides for the prospect of further investigation (Guba, Lincoln, & Lincoln, 1989).

Case study reports are the product of constructivist research. The case study report represents the integrated reality (using the inquiry's description and context) and enables the reader to "experience it vicariously."(Guba, Lincoln, & Lincoln, 1989). The case study report also documents the methodology adopted, making it possible to evaluate the goodness criteria and the study's quality (Guba, Lincoln, & Lincoln, 1989).

2.4.4. Research as Design / Design as Research (RADDAR)

Stapleton (2005) reinterpreted the constructivist inquiry to account for design contexts. A further association between design and research was developed to resolve the critical challenges faced by comparing design activity and action research, namely emancipator participation and systemic reflection.

Stapleton (2005) reinterpreted the idea of the "participant" in a constructivist inquiry. Instead of limiting a "participant" to a human respondent who could engage in the dialogue required for the hermeneutic process, Stapleton extended the idea to a design context, which includes the design materials. The extension of the concept now allowed sketches, notes, photographs, design documents, and prototypes to be considered participants and supplemented the dialogue with traditional constructivist research.

Reimagining the participant also required reinterpreting the hermeneutic dialectic process, as asking materials to nominate another participant for a response is impossible (Stapleton, 2005). The hermeneutic dialectic during design activity is viewed as all the dialogue and conversation that leads to collaboration, which is at the core of prototype development. Collaboration provides a means for a combined reality from the participants and facilitates power-sharing between the participants in the design activity. Stapleton (2005), by reinterpreting 'participant', resolved the vital issue of emancipatory collaboration.

The final issue for design activity to be viewed as action research – systematic reflection – was resolved as the constructivist inquiry required a final deliverable in the form of a case study report. The case study report documents the context of the investigations, the tacit knowledge, and the participants' experiences. The design case study report is in the form of the documented designs (drawings and specifications) and the final artefact produced. The design process could be comprehended and verified as research upon resolving the remaining challenges of systematic reflection and emancipatory cooperation.

2.5. Simulation Modelling

Simulation is an influential and adaptable computational methodology important in comprehending, examining, and forecasting the dynamics of intricate systems. Simulation is a modelling technique that facilitates the creation of virtual representations of real-world situations. This method empowers researchers, engineers, and decision-makers to investigate a diverse array of hypothetical scenarios and examine the dynamics of systems across different settings. Simulation is crucial across various disciplines, including science, engineering, business, and social sciences. It enables researchers to acquire valuable insights into complex dynamic systems that are difficult or impractical to examine using standard analytical methods.

2.5.1. Monte Carlo Modelling

Simulation modelling may be traced back to the introduction of computers in the middle of the 20th century. Among other early innovators, John von Neumann and Stanislaw Ulam created the groundwork for simulation with their work on Monte Carlo techniques, which entailed using random numbers to represent complicated systems (Metropolis, 1987). Monte Carlo simulation is a mathematical technique named after the famous casino in Monaco and was developed to solve complex problems with random number sampling, probability distributions, and the law of large numbers. This method cleared the door for the widespread implementation of simulation.

2.5.2. System Dynamics

System dynamics, developed by Jay Forrester (1999) at MIT in the late 1950s, revolutionized dynamic system modelling with feedback loops and differential equations. It's commonly used to approximate large-scale discrete systems, like population modelling. In its basic form, it involves state variables linked by differential equations, often represented as "levels" and "rates." A causal loop diagram visually depicts system structure and behaviour, with

stocks representing quantities of variables and flows regulating their change rates. While system dynamics typically describes continuous systems, it's often used to model large-scale discrete systems. Agent modelling serves as an alternative for such systems.

2.5.3. Discrete Event Simulation

Discrete event simulation is a valuable modelling tool for analysing and optimising complex systems defined by discrete events and their interactions throughout time. It is a popular simulation technique due to its ability to capture intricate real-world dynamics and give insights into complex system behaviour, which aids in decision-making (Banks, II, Nelson, & Nicol, 2010). The key concepts developed for discrete event simulation are scheduling, sequencing, and state tracking. Using this modelling technique allows the user to track system performance and resource utilisation.

2.5.4. Object Oriented Modelling

Object-oriented simulation modelling uses object-oriented programming principles to design and implement simulation models. Object-oriented programming organises code into objects which capture data and behaviour. These objects are pluggable into code and require specific input parameters into an algorithm to produce a defined result. Object-oriented simulation modelling extends these principles to represent entities and processes in simulation models. This makes simulation models modular and re-useable and provides flexibility (Zeigler, Muzy, & Kofman, 2018).

2.5.5. Selection of Simulation Software

Simio was selected as the simulation software which was used for the design of the simulation game. Although the insurance company already has a commercial license for Simio, it also has all the functionality described above.

3. Methods

This paper is a case study which investigates the impact of the gamification strategy on the adoption of the process simulation services within the insurance company. This is achieved by looking at archival data on the number of simulation models that was requested annually between 2016 and 2021. The archival data was available and provided for processing by the company on which the analysis was performed. Below are the research questions of the case study.

These questions asked whether the implementation of the gamification strategy impacted the adoption of the process simulation services in 2021. They are:

- How did the gamification strategy affect the number of simulation model requests received during 2021?
- Did the gamification strategy impact the reach of simulation within the insurance company?

The research methodology will use propositions instead of hypotheses. A proposition is like a hypothesis, but its primary aim is to indicate a connection between two ideas when that connection cannot be experimentally proven. Consequently, it significantly depends on previous research, acceptable assumptions, and current correlative data (Sciencing: 2023). To answer these questions, propositions were created to prove that a relationship exists between the gamification strategy's implementation and its effect on the adoption of the simulation services. Both these questions could be answered by analysing the archival data by looking at the number of process simulation model requests received during the year and the departments that requested the process simulation models.

3.1. Proposition 1: Number of Models

Analysis of the archival historical data shows the number of process simulation model requests received yearly since the inception of the simulation services within an insurance company. As the gamification strategy was implemented in the year 2021 in this case study, an increase in the number of simulation model requests may indicate if the implementation of the strategy was effective. The following proposition could answer the research question stated in the previous section:

Proposition 1: The gamification strategy of the simulation service increased the awareness of internal customers to the simulation services during 2021.

3.2. Proposition 2: Increased impact of the simulation service

The archival case data also contains the department for which a process simulation model was requested. As the gamification strategy was implemented in 2021, a difference in the number of new departments requesting a simulation model should show the strategy's effectiveness. The following proposition could answer the research question in the previous section.

Proposition 2: The gamification strategy increased the diversity of departments that requested the simulation services during 2021.

4. Conceptual Model and Game

4.1. Simulation Game

The simulation game is the artefact created during the game design process. The simulation game is a conceptual model developed to explain the benefits that process simulation service could provide to the insurance company. A conceptual model is a simplified and abstract depiction of a system, process, or phenomenon often used to show the core concepts or ideas behind a particular notion (Liu & Özsu, 2009). A conceptual simulation model is meant to explore and offer ideas, concepts, or methods rather than confirm or prove assumptions. The simulation game is a structured approach used to highlight the features that simulation as a service could be used. Figure 3 (Simulation Game used in the gamification) below is a screenshot of the simulation interface presented to the participants in the gaming sessions.

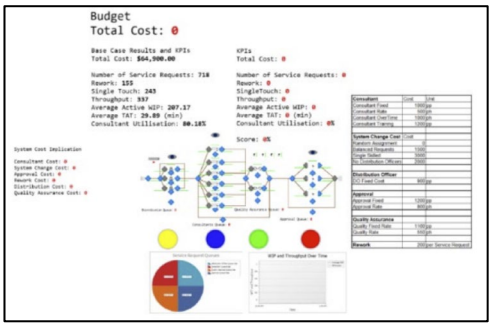

Figure 3. Simulation Game used in the Gamification

The simulation game model consists of a simple four-step process depicted in Figure 4 (Simulated Process Steps). The process starts when a service request arrives based on a pre-determined arrival interval. Entities move from left to right in the diagram, which includes the following steps: Distribution, Service, Quality Assurance, and Approval. Quality assurance can redirect a request and return it to the previous step. The approval step is only completed for service requests for new policies. Each step in the process has a single virtual resource, meaning only one request can be handled at a time.

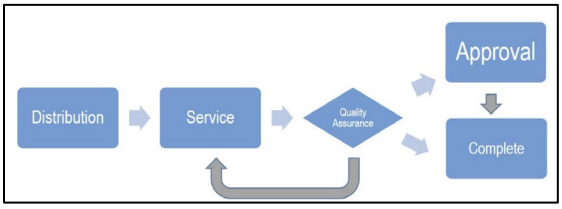

Figure 4. Simulated process steps

The game is designed to allow participants to experiment with changes to properties and compare results impacted by the changing of properties. The simulation game aims to spend as little "money" as possible to gain the best benefits per the pre-defined key performance indicators.

4.2. The Game Features

The simulation game is constructed to mimic a process within the insurance company. The game's features include objects, entities, properties, key performance indicators, financial impact indicators, and internal process variation.

Object
Objects within the simulation model are programable units placed on the game's facility view and have standard and pre-defined behaviours. The model has fixed objects, links, nodes, entities, and transporters.

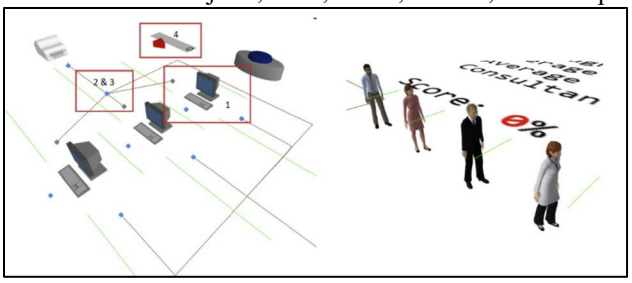

Figure 5. Objects, links, nodes, service requests (entities) and human resources within the game

Figure 5 is a screenshot of the three-dimensional objects that represent the virtual human resources required to complete the process featured in Figure 5 (Simulation Game used in the gamification).

Properties
Properties are changeable values or options for each simulation run. The properties that can change within the context of the game include Resource capacity changes at each processing step, which can be increased and decreased; Changing scheduled working times to include overtime; strategic business options; Additional training for service consultants to reduce rework and priority allocation in a queue of service requests.

Key Performance Indicators
The key performance indicators for the simulation game include the following: Total cost and financial impact (Currency); Service Requests throughput (units); Service requests sent for rework (unit); Average requests Work in Progress (WIP) (units); Resource utilisation (percentage of the time) and Average turn-around-time (minutes).

Variation
The simulation game has elements of variation in the form of processing time delays at each step in the process, the interarrival time between service requests and the probability of accepting or rejecting a service request based on the quality criteria of the process. The service request generated by the game is assigned a level of difficulty. The difficulty level corresponds to the time required for the request to be completed by a resource, i.e., an easy request takes less time on average than a medium request to complete. Difficult requests also require the approval step to be completed in addition to the other steps in the process.

Game Results Interface
The participants in the simulation game session can change specific properties, as discussed earlier. Figure 6 contains some example results that participants might see when the simulation run is complete. These results are firstly compared to the base case results and KPIs and then used to compare against the consequences of the other competitors in the gaming session.

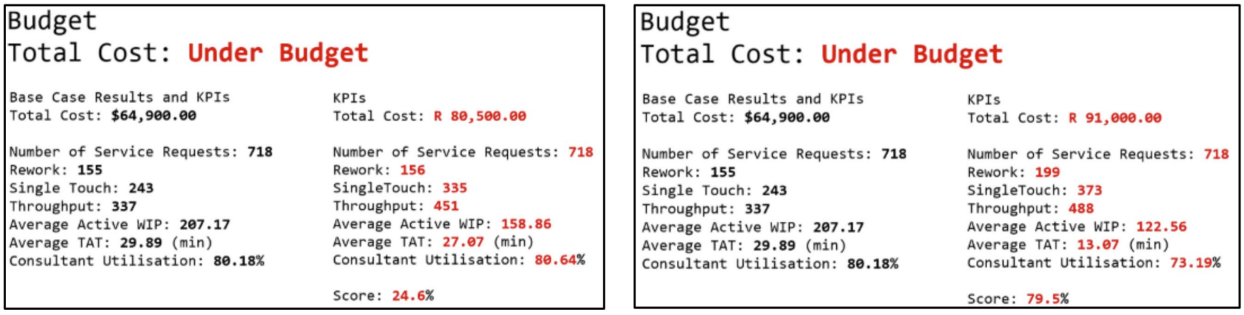

Figure 6. Example Results 1 and 2

Comparing the score between the two examples results in Figure 6, it is evident that the 79.5% score is greater than 24.6%, indicating that the second participant's choices were better. These scores are documented and ranked during the session to show who will be the winner when the gaming session is done. These gaming sessions' results are unrelated to the archival data analysis.

4.3. The gaming sessions – action research and gamification strategy

The simulation game was conducted in virtual sessions. These sessions were held in a single meeting or, depending on the group size, in break-out rooms. Each session was conducted with the following agenda points: Introduction, the process, the game and the feedback session.

Introduction

The concept of process simulation is introduced to the participants during the introduction of the gaming sessions. Before each session, the participants were asked whether they were familiar with process simulation as a tool. By asking this question, it became evident that a low number of participants knew about process simulation before the session. The advantages of process simulation were presented to the participants, and some examples of where process simulation had been previously used within the company were showcased to show the success that can be achieved with process simulation.

The process

The simulation game and the process that the game is based upon (the previous section of this chapter) is explained to the participants. The rules by which the simulation game works and properties that the participants can select to potentially change the simulation game results were also presented. A reasonable amount of time was spent explaining the concept of variation, as most participants were unaware of variation. The participants were shown how the system performance is measured using the combined weighted score. The participants are told that a higher combined weighted score implies a better overall system performance and an improved result.

The game

Participants are encouraged to ask questions before the game begins and to experiment with various game properties. They are shown a detailed view of the game's environment, including objects and cost implications. If breakout rooms are needed due to many participants, multiple facilitators join. The game, simulated over five days, is demonstrated with animated progress indicators. The facilitator initiates the first property change for demonstration. Participants then suggest further changes, with the option to keep or remove previous ones. The most recent changes are typically retained, leading to cumulative effects. Suggestions are documented on a scoreboard, with each participant given five chances to propose changes or until the game's allotted time expires.

Feedback session

The results on the scoreboard are compared, and the participant with the highest combined weighted score is declared the winner and ultimately gets bragging rights. The facilitator then asks the participants in the session for feedback on their experience. The facilitator explains to the participants that this is not the only process that can be simulated, and they then open another model with a different process. The advantages of process simulation are highlighted again at the end of the session, and the participants are asked if they see the potential of the service within their departments.

5. Results and Discussion

The results are based on the implementation of the gamification strategy and are not simulation model results. The results in the graphs below are based on an analysis of archival data which contains the number of process simulation models requested per year and by which departments within the company. The archival data analysis results are divided into two sections corresponding to the research questions:

- the number of process simulation models that were requested per year and
- the reach of simulation services.

5.1. Models per Year

Figure 7 (Simulation Models per Year) contains a graphical representation of the number of models per year the simulation department has received each year since 2016. 2016 was the year when the internal process simulation services were first initiated within the company. For example, in 2018, the simulation department received 11 model requests.

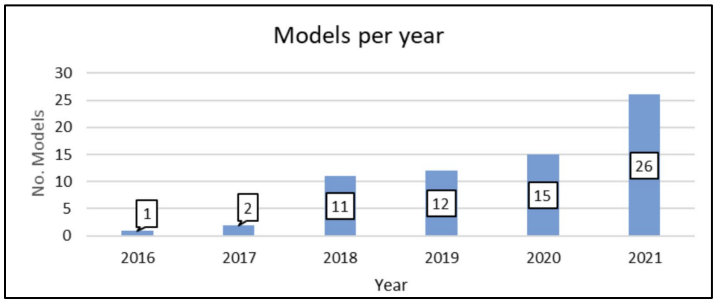

Figure 7. Simulation Models per year

Before 2021, the simulation models were advertised by a word-of-mouth advertising model. As the process simulation service was still in its starting phase in 2016 and 2017, the three models are not considered for calculating the average number of models per year. From 2018 until 2020, an average of 13.33 simulation model requests were received. In the year 2021, when the gamification strategy was implemented, there was an increase in the demand for simulation models. The number of requests increased to 26 models, slightly less than double the average number for simulation models during a year. When looking at Proposition 1, it stated (Figure 8):

- The simulation service's gamification strategy increased internal customers' awareness of the simulation services during 2021.

By comparing the average number of simulation model requests before 2021 to the number of simulation model requests received during 2021, it could be interpreted that the increase in requests for models in 2021 would substantiate Proposition 1.

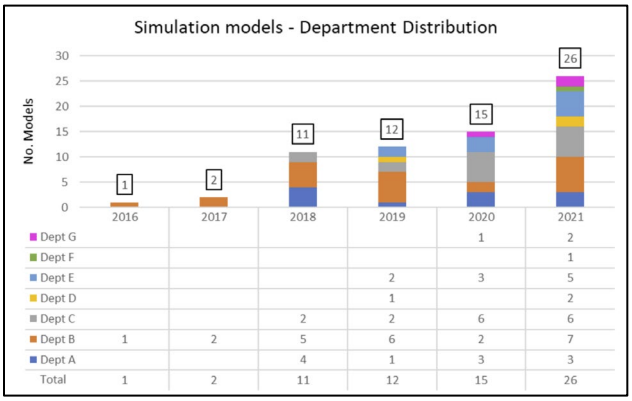

Figure 8. Simulation Models Department Distribution

From the visual inspection, it is apparent that there is an increase in the number of departments which requested simulation models during 2021. The maximum number of departments utilising the simulation service before 2021 was five (in 2019 and 2020), and in 2021, seven different departments requested simulation services.
Proposition 2 stated:

- The gamification strategy increased the diversity of departments that requested models during 2021.

Comparing the number of departments that requested simulation models before 2021 and in the year the gamification strategy was implemented, the increased diversity of departments that requested models in 2021 would substantiate Proposition 2.

5.3. Proposed Improvements

The success of the gamification strategy in this case study is notable. However, it's essential to acknowledge the context leading up to its implementation. Prior to 2021, simulation services were primarily positioned as risk-mitigating tools within the insurance company, with limited explanation of their benefits despite being included in training materials. This existing internal client base and inclusion in training materials could influence the results observed. Nonetheless, the findings suggest promising avenues for future research in gamification and its impact on increasing demand for process simulation services within the insurance sector. Future studies could explore the nuanced effects of different gamification features, such as rewards, competition, or engagement approaches, on various aspects of insurance operations. Additionally, investigating the long-term sustainability of increased demand and its implications for organizational performance would be valuable. Comparative studies across industries or within the insurance sector could also offer insights into the adaptability and scalability of gamification tactics, providing practitioners with actionable information.

6. Conclusion

The main goal of the gamification strategy was to promote the use of process simulation as a decision-making tool. Participants in the gaming sessions were introduced to the concept of process simulation, a powerful technique for analysing complex systems. The gamified simulation model, coupled with competitive elements among participants, effectively conveyed the concept. This friendly competition enhanced engagement and emotional connection to both the game and the simulation service. The strategy employed both intrinsic motivation, driven by participants' desire to improve solutions, and extrinsic motivation, by pitting participants against each other to achieve the best score. An analysis of historical data revealed an increase in departmental diversity in simulation service requests in 2021 compared to the previous year, supporting two propositions. Firstly, the gamification strategy significantly increased awareness of the simulation service, evidenced by a 92.4% rise in service requests from 2020 to 2021. Secondly, it expanded the reach of the simulation services within the company, with requests coming from seven departments in 2021, demonstrating the strategy's success in increasing diversity.

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