

Universidade de Brasília – UnB
Faculdade UnB Gama – FGA
Engenharia de Software

Active gamification: A gamification process based on OODA model

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Brasília, DF
2017



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Monografia submetida ao curso de graduação em Engenharia de Software da Universidade de Brasília, como requisito parcial para obtenção do Título de Bacharel em Engenharia de Software.

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Bruno Contessotto Bragança Pinheiro

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Convidado 2

Brasília, DF
2017

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branco.

*Este trabalho é dedicado às crianças adultas que,
quando pequenas, sonharam em se tornar cientistas.*

Agradecimentos

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*“Não vos amoldeis às estruturas deste mundo,
mas transformai-vos pela renovação da mente,
a fim de distinguir qual é a vontade de Deus:
o que é bom, o que Lhe é agradável, o que é perfeito.
(Bíblia Sagrada, Romanos 12, 2)*

Resumo

O resumo deve ressaltar o objetivo, o método, os resultados e as conclusões do documento. A ordem e a extensão destes itens dependem do tipo de resumo (informativo ou indicativo) e do tratamento que cada item recebe no documento original. O resumo deve ser precedido da referência do documento, com exceção do resumo inserido no próprio documento. (...) As palavras-chave devem figurar logo abaixo do resumo, antecedidas da expressão **Palavras-chave:**, separadas entre si por ponto e finalizadas também por ponto. O texto pode conter no mínimo 150 e no máximo 500 palavras, é aconselhável que sejam utilizadas 200 palavras. E não se separa o texto do resumo em parágrafos.

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Abstract

This is the english abstract.

Key-words: latex. abntex. text editoration.

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Lista de abreviaturas e siglas

Fig. Area of the i^{th} component

456 Isto é um número

123 Isto é outro número

lauro cesar este é o meu nome

Lista de símbolos

Γ	Letra grega Gama
Λ	Lambda
ζ	Letra grega minúscula zeta
\in	Pertence

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1 Introduction

Este documento apresenta considerações gerais e preliminares relacionadas à redação de relatórios de Projeto de Graduação da Faculdade UnB Gama (FGA). São abordados os diferentes aspectos sobre a estrutura do trabalho, uso de programas de auxílio a edição, tiragem de cópias, encadernação, etc.

Este template é uma adaptação do ABN $\text{TeX}2$ ¹.

1.1 Objectives

1.1.1 General objectives

1.1.2 Specific objectives

1.2 Project organization

¹ <<https://github.com/abntex/abntex2/>>

2 Literature review

This chapter presents the concepts that served as groundwork for the development of this work. Section 2.1 is related to the definition of gamification. Section 2.2 presents gamification frameworks. The Observe - Orient - Decide - Act (OODA) loop is described in Section 2.3 and Section 2.4 presents the Goal - Question - Metrics (GQM) approach.

2.1 Gamification

Gamification applies game mechanics and game elements in a non-game context (DETERDING et al., 2011).

The definition of gamification adopted in this paper is the enhancement of services with motivational affordances in order to achieve desired outcomes (huatori & hamari) (FONTE?). That is, given a disered outcome, gamification is used to enhance the way a person, or player, interacts with the given context's environment, bringing benefits for both the player and the context.

2.2 Gamification Frameworks

<what are and a list>

2.2.1 Octalysis Framework

<about octalysis>

2.2.2 Kevin Webarc 6D's Framework

<about it>

2.2.3 Hamari's Gamification Framework

<about hamari framework>

2.3 OODA model

The OODA model in this project is used to guide both the start of a new gamification project, as such as the gamification process's iterations. The motivation of it's usage in the core of the process is because of the complex system formed by the elements

needed for a gamification project. The expected outcomes are not final. As time goes by, a defined goal may be achieved, or a new one can be prioritized. As for the players, as the gamification evolves it will be possible to gather more feedback from their actions within the gamified system, making it possible to observe how they are performing and shifting between different player types inside the four phases of a gamification. Because of this ever-changing environment designed in a gamification project, the OODA model continuous flow will help the designer identify and understand the events that impacts over the gamified system, allowing a continuous analysis and synthesis of its current state, and decide which action to do next.

2.3.1 Observe

Observe is the first step of the OODA model. Observation has a key role on the OODA model as it will guide our decision making process. Thus, it is necessary to not only look to the known information within the context, but to have an awareness of the events that occurs outside of it that can shift the it behaves.

But information itself has no value if there is no meaning. Too much information can hide the important events and information is imperfect or incomplete making it necessary to develop a judgement and better understand the observations necessary for the context.

2.3.2 Orient

Orient is the most important part of the OODA model. It takes account of our cultural traditions, experiences, genetic heritage and shapes the way we observe, decide and act.

This step is where we take the information gathered through our observations and process it in order to make sense of things. According to Boyd, the "destructive deduction" and "creative induction" are part of a continuous process to thrive in an evolving environment, that is, the ability to break apart our old paradigms and mental models in order to build a new concepts more aligned to the new reality that surround us.

By making sense of the observations, it will be possible to devise strategies to achieve the desired goals.

2.3.3 Decide

Decide ...

2.3.4 Act

Act...

2.4 Goal Question Metrics (GQM)

The definition of gamification adopted in this paper is the enhancement of services with motivational affordances in order to achieve desired outcomes (huatori & hamari) (FONTE?). That is, given a desired outcome, gamification is used to enhance the way a person, or player, interacts with the given context's environment, bringing benefits for both the player and the context.

2.4.1 GQM+Strategy

<GQM + STRATEGY>

3 Proposal

The objective of this work is the development and evaluation of a gamification process, Active Gamification, which can be used to guide the development of a gamification project. The proposed process is intended to allow an understanding on how to gamify, guiding whoever is interested in this subject, but mostly newcomers, to create and apply a gamification project.

Thus, this work aims to guide the designer to understand and define the core gamification elements, devise gamification strategies for increased user engagement, decide upon the available strategies and implement the gamification. The core gamification elements in here defined are the desired outcomes and the players that act upon the system. Both of them are not static and will change as the system evolves, which will lead to new possibilities and evolution of the gamification.

The present chapter describes the proposal, its purpose and concepts in which it was based into. The first section, the overview, brings a brief description about the proposed gamification process and its step, the measuring system and other important components. The following sections brings a more detailed view of the Active Gamification Process together with in each step, specifying the purpose, objectives, entry criteria and exit criteria necessary for a successful development of a gamification project, and a possible implementation of the measuring system, the Gamification Dashboard.

3.1 Overview

3.1.1 Active Gamification

The proposed gamification process is defined in four steps: (1) (Re)Define outcome: Related to context analysis and defining the desired outcomes; (2) (Re)Identify player types: Related to analysis of the users that interact with the system; (3) (Re)Design motivation: Synthesis, design of gamified strategies and hypothesis; (4) Playtest: Implementation of the gamification.

The four steps are intended to work as a continuous loop designed to evolve the gamification project, as shown in figure 1. The process was designed this way because gamification is a complex process (CADEFONTE), and it can not be seen as an isolated and static artefact, but as a part of an ever-changing system.

As the project iterates within the continuous loop, the designer must be aware of the changes that occurs within the context and outside of it. The reason is that outside

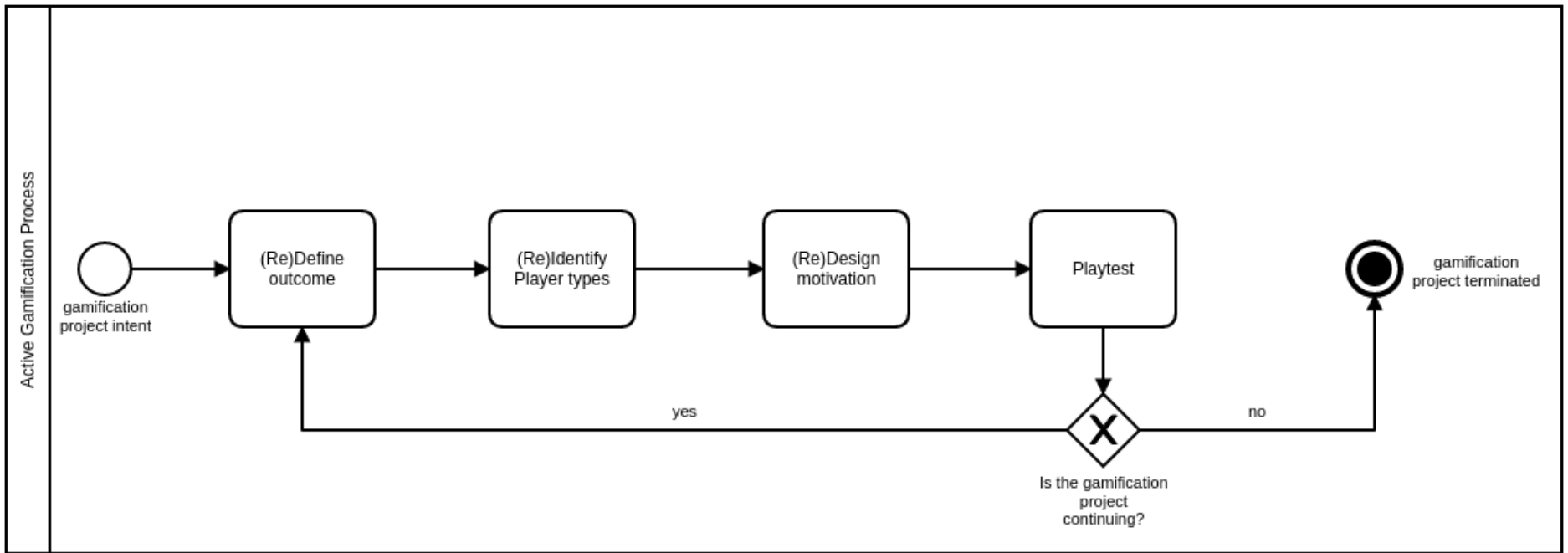


Figura 1 – Active Gamification Process.

events may change important key factors that directly impacts the gamification project. In case it happens, the gamification project must be reviewed and adapted where needed. Because of this system formed by the gamification project, the OODA loop is a strength and its practice is highly recommended.

The time needed to complete a cycle through the Active Gamification process will vary from project to project, as well as on who is designing it. The same applies to the gap between each iteration. Each gamification project and its system, as a whole, will dictate its pace and requirement for evolution.

It is important to note that the model in here presented is only a diagram representation of the process. It was designed this way for an easier comprehension of the steps, taking away the need of technical knowledge, and also for easier adaptation, if desired.

3.1.1.1 (Re)Define Outcome

The outcome definition is the first step of the Active Gamification process. Here is where the context needs to be analysed and understood. This step is critical because if done poorly, it may lead to a generic outcome that may not be what the business actually need. Another important factor of this step is the start of the measuring system development. To evaluate if the efforts have good results, or if the projects itself was a success, the designer must be able to track the changes on the system upon the gamification project implementation and evolution, or changes caused by uncertain external factors.

This step will set the course for the project as the desired outcomes will be identified. They are defined from business objectives or business needs, but other sources of information can be used, such as stakeholders, mission & vision statement of the business, laws, organizational culture, ethics, and any other artefact or element that affects the system.

3.1.1.2 (Re)Identify player types

Gamification takes a human-focused design approach that optimizes the user in the system. To make an optimized environment for the users, they need to be studied and understood, which makes identifying the player type key to the gamification process.

This step has two main activities that involves players. They are the identification of the target group, and later its expansion to player types. To identify the target group, various techniques can be used by the designer, such as interview, brainstorm, questionnaires, document analysis and personas. The later activity will be done by analysing what motivates them with the help of the Octalysis Framework.

A clear understanding of the context and the oportunities that it provides for the users that interacts with it will help the designer to better comprehend the reasons that a

user interacts with the context. These reasons are the player objectives, and by knowing them, it will be possible to better design a gamification project for a more engaging and motivating experience.

3.1.1.3 (Re)Design motivation

The (Re)Design Motivation step is where the designer will go through a process of analysis and synthesis. This can lead the designer to new findings or new questions that can't be answered with what is known so far. If such a scenario of uncertainty happens, it may be necessary to review the previous steps.

The elements discovered and observed from the (Re)Define Outcome and (Re)Identify Player Types steps are analysed by the designer in order to make sense on how to better connect them, creating strategies that engage players into achieving their goals, but taking into consideration the outcomes required in the given context. These strategies are prioritized, committed and implemented into solutions.

During this step, the measuring system will be updated with the committed strategies, linking them with their respective outcomes.

3.1.1.4 Playtest

In the Playtest, solutions based on the gamification strategies decided in the (Re)Design Motivation step are created, piloted, and deployed. Different techniques can be used, as different kind of solutions can be created in this step. In spite of the benefits that the evolution of technology brought to Gamification as a discipline (CADEFONTE), a software solution is not a requirement for a gamification to work.

Another important thing is that a prototype may not always be ideal to develop. The best way to evaluate the gamification is to deploy it and let the real players judge its effectiveness, be it through questionnaires and other direct form of evaluation, or through data acquired from their interaction within the system.

3.1.2 Iterating through the process

The Active Gamification process was designed to be applied in frequent, rapid and short iterations of analysis, synthesis and action of the gamification project. Its conception was based on the OODA loop and in order to better orient, the observations of the different elements that transform our designed system can not be done poorly.

The measuring system suggested for the process, with the usage of the GQM Plus Strategy, will allow the designer to view the big-picture of the gamified system. By linking the outcomes from the context with the gamification strategies, a network of objective-

strategies takes shape. With that, it will be possible for the designer to trace any improvement to the outcomes from the gamification strategies responsible for it. The confirmation of effectiveness of a certain gamification strategy implemented in the system can also be obtained this way. With the information provided from the measuring system, further analysis and decisions can be made, evolving the gamification project continuously.

Continuously evolving the gamification project is important because of the following: The context can change; The players can change; The implementation was not ideal; And the goals of the project were not achieved.

However, project evolution or improvement are not a requirement but a good practice that, if possible, should be put an effort into. But of course, its viability depends on the context and its constrains.

3.1.3 Measuring System

The measuring system must be developed along with the gamification project. The reason is that it will help the designer to keep track on what really matters, revealing which solutions got a positive impact, and which was a failure. In this work, a implementation of a measuring system based on the GQM+Strategy is proposed in section 3.3, called Gamification Dashboard. Although recommended, it is not a one-size-fits-all, and like the Active Gamification Process, it can be adapted to known practices or substituted.

3.2 Active Gamification Process

3.2.1 (Re)Define outcome

This is the first step in the Active Gamification process. The designer understands what drives the need for change. Current problems and oportunities must be analysed and what is expected to thrive, the outcome, must be defined. This step is related to the Observe phase of the OODA loop. It acts as an investigation and will help the designer establish a solid ground for a gamification project.

In order to define the outcomes, the context needs to be explored. This can be achieved by interviewing stakeholders, through analysis of mission and/or vision statement, derived from business needs, business goals or any other strategic document. While building context understanding, project constrains must be defined. These constrains include, but not only, time restriction and resource committed to the gamification project.

The defined outcomes will be agreed and prioritized by the stakeholders. Based on these initial findings, a project charter and vision can be started. It is also important to register the source of information identified so far. These can be useful for traceability

and observation, and since the gamification project will be built based on these findings, any change or transformation will also cause our project to transform.

In a new project, this step is completed if the designer can answer the following questions:

- What are the context goals? And its outcomes?
- Do I know enough elements that compose my system?
- What are the current practices for achieving the defined goals?

For an ongoing project in a second or later iteration, the following questions must also be answered:

- What are the results of the implemented gamification?
- Has any important event occurred? How did it affect the gamified system?

3.2.1.1 Purpose

- Create an understanding about the context;
- Establish desired outcomes;
- Increase awareness of events that may impact the project.

3.2.1.2 Objectives

- Identify and understand problems and opportunities of the current context;
- Identify sources of information about the context;
- Identify and define outcomes.

3.2.1.3 Entry criteria

- Motivation for improvement exists and is shared among stakeholders.

3.2.1.4 Techniques

- Interview;
- Document Analysis;
- Focal group;
- Brainstorm.

3.2.1.5 Exit criteria

- A list of outcomes are defined, prioritized according to business needs and agreed by the stakeholders;
- A list of current practices is registered with their results, if known;
- Elements and events that have influence on the context, and therefore the system to be projected, are identified and registered;
- Initial project charter and vision is completed.

3.2.2 (Re)Identify player types

The designer must know who interacts with the system. This is an complex step in which the designer may use different approaches and dedicate different amount of effort. Identifying who interacts with the system has two basic and distinct levels of analysis. The first level is discovering the target group, which are the players of our system, while the second is understanding each type of player and what motivates them.

The target group can be defined as the different roles or actors that interact or may interact within the system to achieve the desired outcomes. From the context, user actions, inputs and outputs must be evaluated and their requirement must be verified. By eliminating elements that are not required by laws, statements, culture, or any other form of restriction, it will be possible to identify a more generic target group at first, composed from different possibles roles or actors that fits the context requirements and restrictions. That way, different strategies for achieving the desired outcomes may be planned.

Player type is defined as a group of users that are motivated by specific core drives. Identifying player types of a target group can help developing an effective gamification system as well as understanding human elements of a given situation (FONTE CHOU). Each player type is motivated differently within the system. With that said, the designer must then create different ways to engage the players into achieving their goals. Another important thing about player types is that a single person is not always motivated by the same things. As Bartle suggests, a player can switch his play style, changing from one player type to another within time (FONTE RICHARD BARTLE). As the player switch between player types, it is important to balance the way we engage them by developing different core drives techniques and motivations.

Interview, data analysis, role-play, persona and other techniques can be used for identifying player types. The designer must choose the optimal way to gather more information based on his current situation. The use of the Octalysis is recommended in this step to map current practices, how they motivate the players and its effectiveness.

With the players that interact with the system now known, the designer can further develop the project charter, as well as the project vision. It is also important to register all the findings from this step into a player specification document that will compose the gamification project.

The designer can move to the next step if at least the target groups are identified.

3.2.2.1 Purpose

- Know who interacts with the context and why;
- Increase context understanding through its requirements and restrictions;
- Map main core-drives effectiveness within context.

3.2.2.2 Objectives

- Identify target groups;
- Identify player types;

3.2.2.3 Entry criteria

- Initial context understanding.

3.2.2.4 Techniques

- Interview;
- Document analysis;
- Focal group;
- Brainstorm;
- Persona;
- Octalysis analysis.

3.2.2.5 Exit criteria

- Revised project charter and vision;
- Player specification document started or updated;
- List of context requirements and restrictions, including outputs, inputs, actions and resources;

3.2.3 (Re)Design motivation

This step is where the gamification project will start being shaped or evolve. By putting together what was observed and defined in the previous steps, the designer can make sense of how the system behaves and what can be done to engage the players and achieve the desired outcome. To start this step the gamification elements must be known. The desired outcomes from the context will be committed and lead the designer to game objectives. Player types will help understand who will act in the system and other informations such as laws, organizational culture, ethics, restrictions, required outputs and any other artefact that influences the system will act as game rules, milestone and actions required in the player journey.

If any required information is not certain, unknown or may have changed during the development of this step, it is necessary to review the previous steps before continuing. Incorrect information may lead the project to undesired outcome, which maybe cause project failure or loss of efforts. There may also be cases where an output is only required because of a existing process, being part of a mean to achieve the desired outcome, or maybe some activities and tasks are defined as required, when actually they are not. For a gamification project, the existing activies or tasks are not important. They are only ways of achieving a required output, but it is also possible that a new strategy to achieve the same outcome may not need the said required outputs at all.

From the committed outcomes and identified players types, gamification strategies will be devised. These strategies makes use of gamification techniques, adapted to context in question. The Octalysis Framework will be used to model the project and better balance the gamification and the amount of investment in each core-drive, and thus, guiding the designer for better application of gamification techniques in a way to optimize the gamification project results.

During this step, gamification strategies need to be prioritized and decided upon. For it to happen, Hypothesis will be formulated. If the application of a certain technique is known to the designer, it can be opt to skip its analysis and start its implementation, but such approach is only recommended if the impacts of the gamification strategy in the system is well known, be it positive of negative. To decide upon which gamification strategy to implement, the stakeholder must approve. The stakeholders approval is important because each strategy is unique with its own resource investment required. The denial of a gamification strategy may impact all that was planned so far, making necessary to review the previous work done in this step.

The measuring system will be updated with each committed gamification strategy by linking them with their respective outcome.

3.2.3.1 Purpose

- Gamification project evolved and updated;
- Gamification strategies developed and committed upon;

3.2.3.2 Objectives

- Understand how the player interact within the context;
- Understand ways of achieving desired outcomes;
- Commit to outcomes that will be achieved with the gamification project;
- Develop and commit to gamification strategies for context improvement;
- Link committed gamification strategies to committed outcomes for measuring system development.

3.2.3.3 Entry criteria

- Outcomes prioritized and updated;
- Player types identified and updated;
- Updated Context requirements and restrictions known by the designer;

3.2.3.4 Techniques

- Brainstorm;
- Octalysis Framework level 1;
- Octalysis Framework level 2;
- Octalysis Framework level 3;
- Focal group;

3.2.3.5 Exit criteria

- Level 1 to 3 Octalysis analysis is documented, baselining the current gamification of the context;
- Gamification strategies for improvements are planned and registered, and a level 1 to 3 Octalysis analysis is developed highlighting the improvements in the gamification;

- Start/update a Gamification Project plan with the committed outcomes, player types, gamification baselines and strategies devised for improvement;
- Updated measuring system, composed of outcomes and gamification strategies.

3.2.4 Playtest

The playtest step is where the planned gamification project is applied in the context and evaluated by the players. For this to happen, it is first necessary to implement the gamification strategies. The implementation of a gamification project will vary depending on context requirements and restrictions identified in previous steps, and it can lead to a digital or physical solution. A digital solution can be a software development such as an web application, mobile app, or evolution of an existing software. In other hand, a physical solution will involve tangible components, such as card decks, cardboards and maps, for example.

The implementation methodology must also be defined upon best fit for the context, and with it if the gamification project will be implemented and deploy as a whole, or divided in incrementable deliverables based on each gamification technique that compose the gamification project. For an complete implementation of the planned gamification project, playtest will serve as a way to evaluate the success of the project. In the later case, each gamification technique delivered and applied will transform the context. This transformation must be observed and leveraged, thus, each delivery will result in a new iteration of the process until it is completed.

3.2.4.1 Purpose

- Have the gamification project applied in the context and evaluate if the committed outcomes and player goals were achieved.

3.2.4.2 Objectives

- Implement the gamification project, be it iteratively or once as a whole, in a digital solution or a physical solution;
- Deploy the solution in the context;
- Evaluate, through playtest, if the solution match what was expected.

3.2.4.3 Entry criteria

- Gamification project planned and agreed upon by the stakeholder;

3.2.4.4 Techniques

- Desired methodology for development.
- Playtesting for evaluation of gamification project or technique effectiveness.

3.2.4.5 Exit criteria

- Gamification technique or project implemented and applied in the context, which will cause transformation;
- Transformations caused by the gamification technique or project evaluated and the results analysed. This will lead to project success or failure, in which the designer can then conclude the project or launch a new iteration for project evolution.

3.3 Gamification Dashboard

The Gamification Dashboard is a implementation of the GQM+Strategy together with the OODA loop. It serves as a main interface between the stakeholders and any information pertinent to the gamification project.

The purpose of this dashboard is to help the designer to keep track of all components of the project that composes the gamification system. They are:

1. Committed outcomes;
2. Approved strategies, together with gamification techniques used for it, target groups that will participate in the techniques and, if possible, what player type is it on, and a description, detailing any needed information;
3. Target groups and players;
4. Known sources of information;
5. Outside elements and events that may impact our system;
6. requirements, restrictions and constrains.

The dashboard will also show project status and performance, comparing current situation with previous project baselines. This will help identify strengths and problems with the designed gamification, allowing a continuous improvement.

Figure 2 illustrates a baseline of a example project, showing how to link an outcome with its strategy, both together with their respective GQM.

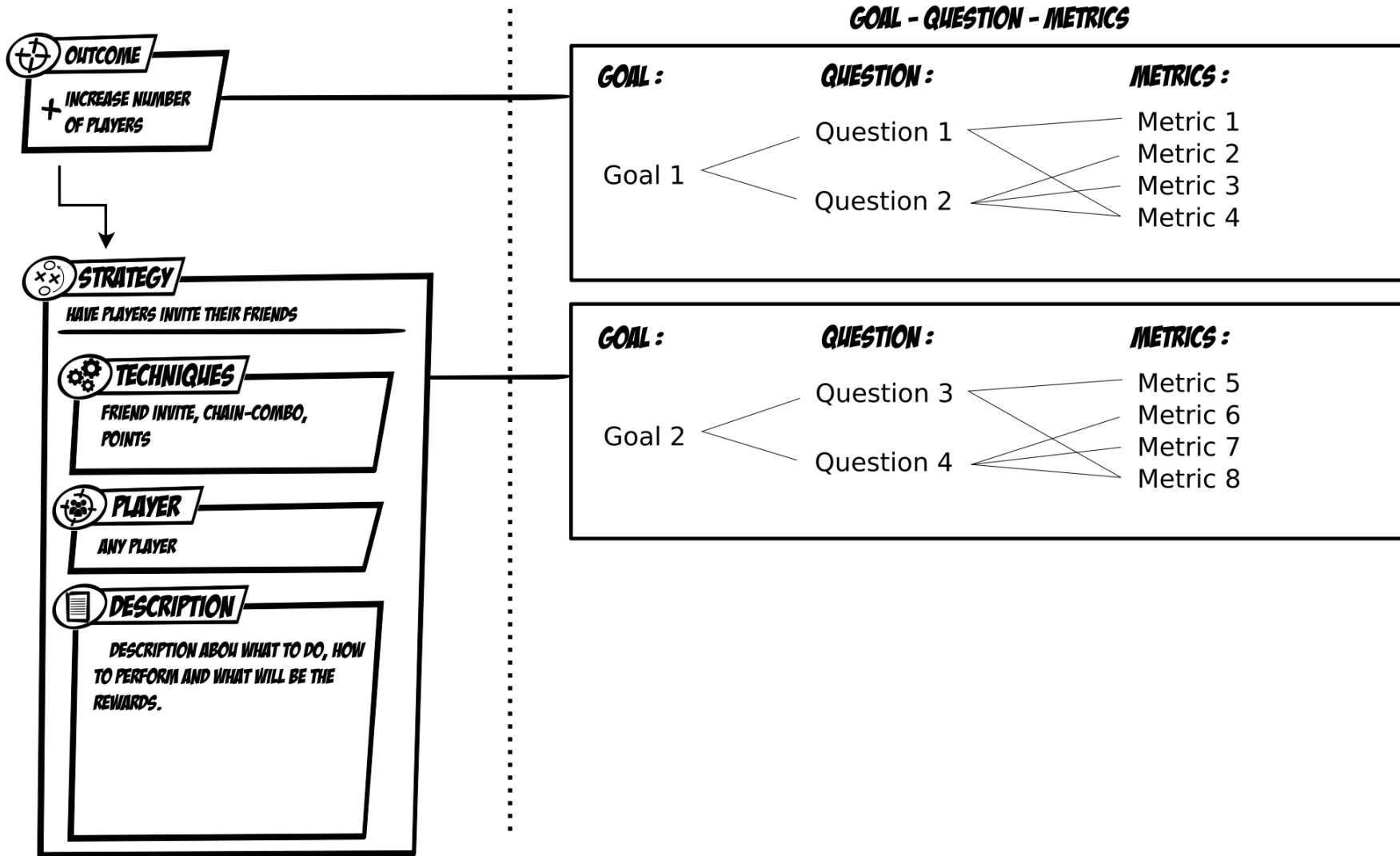


Figura 2 – Gamification Dashboard example.

4 Proposal Development

<DEVELOPMENT>

4.1 Planejamento

<DEVELOPMENT>

4.2 Tecnicas

<DEVELOPMENT>

4.3 Resultados

5 Conclusion

5.1 Final considerations

Referências

DETERDING, S. et al. From game design elements to gamefulness: defining gamification. In: ACM. *Proceedings of the 15th international academic MindTrek conference: Envisioning future media environments*. [S.l.], 2011. p. 9–15. Citado na página [31](#).

Apêndices

APÊNDICE A – Primeiro Apêndice

Texto do primeiro apêndice.

APÊNDICE B – Segundo Apêndice

Texto do segundo apêndice.

Anexos

ANEXO A – Primeiro Anexo

Texto do primeiro anexo.

ANEXO B – Segundo Anexo

Texto do segundo anexo.