

CO3 Project

Game Element Taxonomy Gamification



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Game Element Taxonomy

Introduction

Gamification in the context of civic engagement is a possible means to positively influence active participation on online civic platforms. On the other hand, gamification is also useful as part of the motivational design and can influence the behavior of the users based on the incentives they receive. Thus, counting with information regarding motivators contributes to effective gamification design. Consequently, one of the main goals of gamification in e-government services is to increase user motivation and engage citizens as active players through measures that facilitate activities such as taking part in the public conversation, giving feedback to possible local government decisions, or actively meeting common objectives. However, gamification is still a relatively emergent area of scientific inquiry and there is still a lack of understanding of how such goals could be materialized (Hassan, 2016). In their literature review, Contreras-Espinosa and Blanco (2021) revealed that the majority of works focused on the inclusion of gamification in e-government services does not follow any methodology in order to quantify the impact of the implementation of game elements and that the selection of these elements is rather a consequence of the expectations of the designer. For example, Bista et al. (2013) proposed the implementation of game elements over an online community for young people transiting from parental support towards economical emancipation in an e-government interaction and service called Next Step. This initiative from the Australian Department of Human Services enabled transactions between citizens and the management of the service itself. The designers of this work included basic game elements such as points and rankings, but they did not conduct a previous analysis to select them, or any post-analysis to evaluate their impact. Thus, game elements were selected based on the preference and expectations of the designers, rather than according to the objectives of the implementation. Blazhko et al. (2017) addressed citizen stimulation to understand available open government data. This service provided the citizens with different types of information to teach them about a variety of concepts and indicators, such as pollution, death rates, etc. The main goal was to improve citizen information levels to encourage and facilitate informed decision-making during elections or other democratic processes like referendums. To motivate the users, the researchers gamified the service including elements such as points, rankings, and rules. However, this work was also characterized by a lack of formal criteria to determine which elements to implement, and which indicators could be useful to assess their performance. These examples highlight the present demand for a taxonomy or any other tools that can help designers select the most appropriate game elements for public services. This document shows part of the results of the work of Contreras-Espinosa and Eguia-Gomez (2021).



Gamification

Playing games has increasingly become a widely visible form of leisure with demonstrated affordances for human engagement, flourishing and skills development (Hassan & Hamari, 2020). Gamification is about the design of systems, services, and processes towards inducing engaging, positive psychological experiences and these experiences can be translated into a behavioral engagement and employed to elicit participation in different contexts such as production management or urban planning. In the field of e-participation, gamification appears to have the potential to increase citizen engagement with the common good and societal decision-making. It has been used to provide special incentives for citizens towards public participation (Romano et al., 2021) and to improve e-government services, leading to new research and practical work on gamified e-participation.

Gamification Frameworks

To facilitate the design of gamified systems, several studies have proposed different gamification frameworks. The most well-known include:

- Mechanics-Dynamics-Aesthetics (Hunicke et al., 2004).
- Six Steps to Gamification (Werbach & Hunter, 2012).
- Octalysis (Chou, 2015).
- GAME (Marczewski, 2013).

Some of these frameworks aim to help designers choose which game elements should be employed in gamified strategies. However, using frameworks is not an easy task since many of them present limitations, ranging from their purpose (Dichev & Dicheva, 2017), to the number of definitions of game elements used, or a lack of knowledge or common understanding of the set of elements that can be used by gamified systems which can confuse designers. The first problem encountered by designers is choosing which game elements are appropriate for the users, but the absence of conventions on element naming, or the lack of consensus on which elements belong to gamification are other issues found in the literature, as different synonyms are often used to designate the same item (Koivisto & Hamari, 2019). In general, the most frequently employed gamification elements are points, badges, and leaderboards. Point (score) constitutes the main game element, as designers consider it as the basic metric on which other aspects are built upon. It quantifies user progress, and without this element, it is unreasonable for the user to obtain badges, arrive at levels, or progress on leaderboards.

Motivations

Intrinsic motivation is an internal motivational drive to behave in a certain way for the sake of the behavior itself and the internal reward it provides (Hassan, 2016). Extrinsic motivation, on the other hand, is the pursuit of a behavior conditioned by some other external reason (Rigby, 2015). During the design of a service, both motivational affordances are used with the intention of affecting the intrinsic and extrinsic motivation of the users. In consequence, this can affect the directional expression of the motivation in terms of a behavioral change or increased engagement of the user with the service (Koivisto & Hamari, 2019).

Gamification based on providing rewards or badges is effective for a quick behavioral change, but it only lasts for as long as the rewards are available, while the Organismic Integration Theory emphasizes the negative correlation between intrinsic and extrinsic motivations. When gamification is introduced as a reward mechanism, the long-term levels of intrinsic motivation are adversely affected (Rigby, 2015). Thus, if the goal is to

induce a long-term change, then rewards may be less adequate because it would constitute an instability to replace intrinsic rewards for behaviors with an increasing dependency on extrinsic rewards.

Sustained engagement is a consequence of the fulfillment of three basic needs, as proposed in the Self-Determination Theory, a motivation theory (Rigby, 2015). The first is represented by the core psychological needs in intrinsically motivated behavior: free choice and the potential to behave in accordance with one's wishes. The second basic need is the drive to learn new skills to the point of excellence. Finally, the third need is the feeling of belonging to a community.

Game Element Taxonomy

The main goal of a taxonomy is to identify, classify, and give names to elements according to their characteristics. We propose a taxonomy that includes a list of selected game elements, the concept definitions, the type of elicited motivation (extrinsic or intrinsic), and the dimension (Table 1).

Table 1. Game element taxonomy

| Game element | Concept | Motivation | Dimension |
|--------------------|--|------------|-------------|
| Reputation | Related to the titles, classification, or status that a player may gain and accumulate. Represents a social status that does not reflect the players' skills. Used to create a hierarchy within the game environment or the communities. | Intrinsic | Social |
| Competition | When two or more players compete against each other towards a common goal. Related to tasks in which citizens have to cooperate. Though it is the opposite of cooperation, both elements can be used together. | Intrinsic | Social |
| Cooperation-Team | The combined action of a group of players, especially when efficient and effective. | Intrinsic | Social |
| Social interaction | The interaction with other players, especially for pleasure. | Intrinsic | Social |
| Progress bar | Allows players to locate themselves (and their progress) within a game with progress bars, maps, steps. | Extrinsic | Achievement |
| Reward-Prize | A positive consequence for a player as a result of a given behavior or action which is desirable, such as the return of lost items when found. | Extrinsic | Achievement |
| Level | Hierarchical game layers, providing a gradual way for players to obtain new advantages upon advancing. Examples: character levels, skill levels. | Extrinsic | Achievement |
| Badge | Elements that symbolize the rewards given to players for their achievements, such as acing a skill. Badges help players feel recognized for their efforts. | Extrinsic | Achievement |
| Point | Unit used to measure player performance. Examples: scores, number of kills, experience points. | Extrinsic | Achievement |

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| Leaderboard-Ranking | Related to the visual information provided by the game environment to the players, where they can see their completed actions or tasks, or overall stats. | Extrinsic | Achievement |
| Mission | Provides the player with a goal or a purpose to perform tasks, such as receiving discounts after obtaining a certain score in a task. Also known as quests, side-quests, to-dos, milestones, or objectives. | Intrinsic | Particular |
| Puzzle | Related to the activities that are implemented within the service. They can be considered as learning challenges or cognitive tasks. Also present through quizzes. | Intrinsic | Particular |
| Goal | The object of a person's ambition or effort; an aim or desired result. | Intrinsic | Particular |
| Customization | The action of modifying something to suit a particular individual or task. | Intrinsic | Particular |
| Emotion | Visual or sound stimulation. Related to the use of the players' senses to improve their experiences using Virtual Reality, Augmented Reality, or dynamic interfaces. | Intrinsic | Particular |
| Vote | Action through which an individual expresses their support or preference towards a certain motion, proposal, or candidate. | Intrinsic | Particular |
| User profile | A collection of settings and information associated with the characteristics and preferences of the player. | Intrinsic | Particular |
| Player roles | The player assumes or acts out in a particular role that was previously defined by the game designer. | Intrinsic | Imaginary |
| Stories | Order of events happening, i.e., choices influenced by player actions, such as strategies the player uses to go through a level (stealth or action), that also influence the ending. | Intrinsic | Imaginary |
| Avatar | Allows personalization. For instance, players may adapt it to their actual physical appearance. | Intrinsic | Imaginary |
| Rule | Statement that tells players what is or is not allowed in a particular situation. | Extrinsic | Context |
| Lifetime | Related to time itself and used to push forward the players' actions. In e-government services, it can be represented as deadlines (e.g., to use coupons), countdown timers, or clocks. | Extrinsic | Context |
| Economy | Concept related to any transaction that may occur in the platform (i.e., exchange, crowdfunding, market, etc.). Example: trading points in exchange for advantages related to the content, etc. | Extrinsic | Context |
| Imposed Choice-Action | When the player is faced with an explicit decision that they must make to advance. Example: show the players two different options and make them | Extrinsic | Context |

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| | choose one or another, blocking their progress until they pick one. | | |
| Forum | Players may exchange ideas and discuss different topics, especially important public issues, with other players, in one space that acts as a repository for the messages in the form of a list. | Extrinsic | Media |
| Chat | Players talk to others who are using the service or platform at the same time through the exchange of typed messages in one space that acts as a repository for the messages, and with others that may be interested in the same topic. | Extrinsic | Media |
| Share | When players broadcast content on social media to their friends, groups, or specific individuals. Players enjoy sharing content with their connections. | Extrinsic | Media |
| Post | When players post ideas or information and discuss issues in messages entered into a service or platform, such as a discussion group or online forum. | Extrinsic | Media |
| Emoticons- Emojis | Emoticons (punctuation marks, letters, and numbers used to create pictorial icons) are a display for players to express an emotion or sentiment. Emojis (pictographs of faces, objects, and symbols) have the same objective, but they represent faces with various expressions, as well as buildings, animals, food, objects, and more. | Extrinsic | Media |
| Location tagging | The process through which a player attaches location information in the form of geographical metadata. Geo-tags may be used in digital output, for example, as tweets or posts updates on social media. | Extrinsic | Media |

Game Element Dimensions

The taxonomy includes a classification using different dimensions, to group the selected game elements: Social, Achievement, Particular, Imaginary, Context, and Media (Table 2).

Table 2. Game element dimensions

| Dimension | Description |
|-------------|---|
| Social | Related to the interactions between players and the game environment. Without social elements, players may feel isolated or unable to interact with others. Examples: Reputation, Competition, or Cooperation-Team. |
| Achievement | Reveals the situation of the player and can be used to provide feedback. The absence of this dimension may result in the players feeling lost, due |

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| | to a lack of clear feedback from the system in relation to their actions. Examples: Points or Levels. |
| Particular | Related to the player using the game environment. The lack of these elements can make players feel demotivated because the service does not adapt to them. Examples: Missions or User profile. |
| Imaginary | Reveals the habitat or fictional space in which the game takes place through storytelling that connects player experiences to the context. Fictional elements can be employed to provide context or create an immersive experience. Players may complete tasks following stories that may influence their game experience. Examples: Player roles, Stories, or Avatar. |
| Context | Related to the environment in which the gamification is being implemented. Game elements can be represented as properties. The lack of these elements makes the game environment feel boring. Examples: Economy or Lifetime. |
| Media | Related to the interactions of players with social media and other technologies to chat, share, post, write, etc. With media elements, players may express to public administrations or others what they feel, think, vote, etc. Examples: Post or Location tagging. |

Examples of Use

Examples of services and platforms are described in the following paragraphs to illustrate the analysis and evaluation of the taxonomy. Thiel and Fröhlich (2017) created an interface with game elements to evaluate the impact of gamification to motivate citizens to improve their city. The gamified application enabled reporting issues in the city to the public administration, such as damages or improvements required in public services or various areas (Table 3).

Table 3. Game elements in example 1

| Game included | elements | Dimension |
|---------------|---------------------------------|-------------|
| | Social interaction | Social |
| | Point Leaderboard-Ranking | Achievement |
| | Mission Goal User profile | Particular |

| | |
|--|-----------|
| N/A | Imaginary |
| Rule Lifetime Economy | Context |
| Post Emoticons-Emojis Location tagging | Media |

With the taxonomy, it is possible to observe that this service presents 12 game elements with 5 different areas, with very solid Particular (3), Context (3), and Media (3) dimensions, including game elements within the Achievement (2) and Social (1) dimensions, while the Imaginary items are completely absent.

The element social interaction (Social dimension) enables users to interact with other citizens and discuss and notify where they encountered issues in the city, such as cracks and bumps in the road, for instance. Points (or meters traveled) are assigned based on app and user activity, a Leaderboard provides a visualization of the tasks the citizen has completed, and the Ranking promotes competition among the users by displaying and comparing their progress (Achievement dimension). Missions are employed to provide the user with purpose and motivation to perform the tasks to achieve the Goal, i.e., reporting the problems encountered in the city, and citizens count with a user profile that displays their personal information and characteristics (Particular dimension). The application counts with a set of rules the users need to follow, their actions are pushed forward thanks to the Lifetime element and, throughout the process, users can get rewards that they can trade in the application store for available products through transactions, representative of the economy element (Context dimension). Users may post, use emoticons to express how they feel, and include Location tagging in their reports (Media dimension). Some of the elements present in this example seem to be commonly used, such as Ranking (Achievement dimension), present in the applications described by Kazhamiakin et al. (2016), or Post (Media dimension), which also appears in the services described by Bianchini et al. (2016).

The application described by Rodrigues et al. (2019) focuses on two key aspects: competition and reward. It was designed to help the public administration promote events for citizens, cultural festivals, or seminars taking place in the city and to stimulate tourism. On the other hand, the application allows users to point out anomalous situations they may encounter across the city, see reports by other citizens, and confirm that such situations are solved. The prototype required establishing communications between a mobile application and a central web server that acted as the provider of all the necessary information for the correct operation of the app. This initiative was based on a gamification framework specifically designed for Smart Cities and included the game elements compiled in Table 4.

Table 4. Game elements in example 2

| Game included | elements | Dimension |
|---------------|---------------------------------------|-------------|
| | Competition | Social |
| | Progress bar Reward-Prize Point | Achievement |
| | Mission Goal Puzzle Vote | Particular |
| | Stories | Imaginary |
| | Rule Imposed Choice-Action | Context |
| | Location tagging | Media |

According to the presented taxonomy, this second example includes 12 game elements that represent the 6 areas, with robust Particular (4) and Achievement (3) dimensions, and elements ascribed to Context (2), Social (1), Imaginary (1) and Media (1). This gamified application is focused on Competition (Social dimension) and uses a Progress bar to display the evolution of the users, that gain Points and Rewards based on their participation and actions (Achievement dimension). Citizens are rewarded upon Mission completion and challenge or Puzzle fulfillment at specific touristic places, while they are also encouraged to pursue a clear Goal, i.e., to report anomalous situations within the city, and exercise their capacity to Vote, rate events, and participate in city hall decisions (Particular dimension). In addition, the gamified environment takes advantage of the element Stories (Imaginary dimension). A series of Rules and Imposed Choice-Action govern the application, for instance, by forcing the user to choose an action to continue using the system (Context dimension). Location tagging is also a useful element in this environment, for example, to produce localized reports (Media dimension). Some of the game elements included in this example seem to be commonly used as well, such as Stories with characters (Imaginary dimension), that are employed in the works of Kazhamiakin et al. (2016), or Location tagging (Media dimension), described in Gnat et al. and Olszewski (2016).

The proposed taxonomy contributes to simplifying the game element repertoire, as there is no consensual classification and some applications only employ the most popular and basic elements: points, leaderboards, and missions.

Social dimension is related to the interactions between citizens and the social aspects of the game environment. These elements connect people and can have an influence on their behavior in relation to a task and, therefore, they must be employed carefully. Regarding the elements included in this dimension, Reputation represents the social status the citizens can achieve within the service or platform. The best citizens, or those who participate most, obtain a better reputation and a high status, but users that do not have a good reputation may experience a lack of acknowledgment and conclude that their actions are not meaningful. Competition contributes to active environments in which citizens try to beat other users in order to obtain a prize. Nevertheless, to design an optimal competition, it is important not to tie it exclusively to reward-based activities (Papadopoulos et al., 2016). In contrast to Competition, Cooperation is seen as a positive addition to e-government environments, although it is not easy to apply. Cooperation-Team constitutes the combined action of a group of players to complete tasks together. The absence of actions in the group may lead to segregation, which may result in the user abandoning the platform. The use of this element may encourage citizens to share actions, information, and work together, and it can be helpful for social connectivity, to overcome group challenges, and for activities that include remote or direct competition (Foxman & Forelle, 2014). Finally, Social interaction refers to the interaction with other users, especially for pleasure, though it may also be somehow enforced by the service through the activities assigned.

The Achievement dimension must always be present in any gamified environment so that the users receive feedback on every action, for instance, through Points, Levels, or Badges. The absence of this dimension may result in users feeling lost or frustrated because their actions and interactions are not being overtly recognized, which may lead to unexpected outcomes, such as the undertaking of actions that were not foreseen by the designers. Progress bars are considered a highly relevant element when learning something since a perceived lack of progression might lead users to a feeling of frustration. Another basic and highly relevant element within this dimension is Reward-Prize. Motivations for gameplay include the addition of extrinsic rewards, such as vouchers or coupons for reduced garbage collection charges, parking, or entrance fees to public amenities (Crowley et al., 2012). Level is also considered a significant element and represents the relative position in relation to others using the service or platform. Badges, Points, and Leaderboard-Ranking are pillars, and they are present in almost all gamified platforms and services as interconnected elements. For some users, a point system attached to public status is important enough to them to perform a dull task, but for others a leaderboard is meaningless and the task itself needs to be transformed through gameful activities to provide that connection (Nicholson, 2012). Therefore, it is crucial to remember that the use of a scoring system with points requires a deeper connection with the activity to establish a meaningful connection with the experience. In addition, providing multiple streams to achieve points within the gamification system can allow users to select those methods most meaningful to them (Nicholson, 2012). Badges are features that similarly reward users, and Ranking systems can be based on badges that unlock promotions or new features. Leaderboard-Ranking may be included in other services, in which each check-in made by the users leads to accumulating points.

The Particular dimension is related to the citizen using the environment. The lack of this type of element can make the citizen feel demotivated because the service does not provide enough context for the user. Missions or Puzzles are examples of intrinsic motivation elements that the user might not perceive as game elements because their format masks their gamified nature. Missions provide the citizen a goal or a purpose to perform tasks and are also known as quests, side-quests, to-dos, milestones, or objectives. The mission breaks down the goal and provides a set of related tasks designed to achieve it. It can include different levels, and players may be rewarded upon

completion of each level or mission (Shah, 2012). Puzzles are represented through challenges, i.e., activities that are implemented within the service, and they can be considered as learning challenges or cognitive tasks. The Goal is a basic game element present in all environments with a gamification strategy, and without it, the user may feel lost or confused. On the other hand, designers should be cautious not to encourage undesired actions. For instance, the inclusion of too many simultaneous goals may lead users to pursue several of them without attempting to complete them accurately. Therefore, it is paramount to identify what the organization intends to achieve with gamification in order to delimit this element. Customization is another intrinsic motivation game element, and it is the action of modifying something to suit a particular individual or task. Emotion, is considered to be a highly relevant intrinsic motivator. It is related to the use of the senses, such as visual or sound stimulation, to improve the experience of the user through Virtual Reality, Augmented Reality, or dynamic interfaces. It is noteworthy that major privacy issues may arise, nonetheless, while the user is interacting, for example, with Augmented Reality markers in public and providing sensitive personal information such as username access (Contreras-Espinosa et al., 2021). This problem can be solved by informing the user about what personal data is used. Vote represents an action, such as emitting an online comment or clicking on an icon to participate in city hall decisions. Voting could be seen as the consequence of the capacity to decide. By voting, citizens essentially decide on a concrete matter, but they often do so on a single occasion (Thiel et al., 2016). In e-platforms, citizens are encouraged to participate and actively select, through their vote, the options to be implemented by the administration. The aim is not only to collect input from the users, but to involve citizens in decision-making and receive qualified proposals. The last element is User profile. Platforms must capture and manage user profiles in order to provide users with adapted services. All this information collected by e-government platforms may be useful to detect behavioral patterns that enable personalizing missions, establishing the difficulty degree of the game, or choosing which type of rewards should be given to the users.

The Imaginary dimension is responsible for revealing the game environment and may include storytelling that connects with the experiences of the user and the context. Citizens may complete tasks following Stories, and this can have a positive influence on their game experience. Stories are instruments to materialize a narrative, and they can powerfully do so in a stylish manner, by using text, music, audio-visuals, or other technologies. They may affect user engagement because they can be employed to provide additional information or context to the physical reality (e.g., provide historical information about a certain location in services devoted to promoting touristic places), or provide alternative explanations for tasks that the user must solve. Player roles and a compelling narrative to encourage user participation are key factors that improve both the process and the results. Avatar is not a common game element when designing e-government environments, it can constitute a robust tool to connect the user with the storytelling.

The Context dimension is related to the environment in which the gamification is being implemented. These game elements can be represented as properties and their absence makes the game environment feel boring. Lifetime is also a key success factor for gamified platforms and affects and determines user expectations. For instance, knowing the remaining lifetime affects how players organize their activities. Economy is the element represented by any transaction that may occur in the platform (e.g., exchange, crowdfunding, etc.), and these can be connected with blockchain. Last, the Imposed Choice-Action element provides options for the user, who is forced to make a decision, although it is crucial that designers include absolutely clear information about each option.

The Media dimension is related to the interactions of the citizens with social media and other technologies. It is necessary to allow the user to participate in Forums, Chat, Share, Post, send Emoticons-Emojis, or perform Location tagging. The implementation of these technologies will allow not only the improvement of spatial planning processes but also the development of an open geoinformation society that will create smart cities (Gnat et al., 2016).

Despite the main focus in application design typically lies on gamification and technology, the authors of this work are particularly concerned about how citizen privacy might be invaded when applying gamification due to the current use of ICT and consider that this issue should be addressed when designing smart cities and e-government platforms.

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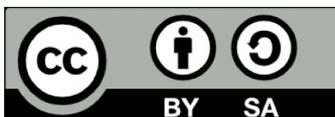


- LINKS FOUNDATION**
Process design and model definition for PV/ Citizens collaboration
- FLEXIGUIDED GMBH**
Disruptive technologies for co-creation, co-production and co-management
- DAEM**
Stakeholder engagement & pilots implementation
- OLA**
Evaluation of pilots
- UNITO**
Impact Assessment and business plan
- FUB**
Dissemination/Communication, Exploitation
- UNITO**
Project Management

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