

BEATS & UNITS: A STORY-GAME DESIGN FRAMEWORK

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Abstract

There are no recipes or rules to develop games, any more than there are to develop stories. When we try to define a game system that not only has to create a balanced experience, but also has to tell a story, which can engage players in creating empathy and meaning, everything gets complicated. We faced this problem when we had to develop a serious game with the goal of promoting discussion and awareness among children around nutrition: FlavourGame. In this regard, we needed not only to design game mechanics that would feel complete and progressive, but also to create a narrative that provided meaning to the game experience, in order to ensure an underlying layer to the context of nutrition. For that, we had to develop a framework that could help the team in guiding the telling of the story while designing the progression of the game. In this article, we present the full framework as a story-game design approach to be employed in the creation of serious narrative games.

Keywords: Narrative Design, Serious Games, Storytelling, Play, Creativity Process, User Experience Design.

1. Introduction

Narrative Design has only emerged in the game design world in the last decade (Brunette, 2014; Jubert, 2017), as a way to bring story writing and game design together (Batchelor, 2019; Heussner, Finley, Hepler, & Lemay, 2015; McRae, 2017). The complexity of this merger arises from the fact that they are both integral systems for generating human experience, and as such, when brought together they collide by the force with which they attract to themselves the control of experiences (Zagalo, 2020b). We are therefore still facing a process in the search of solidification in ways of doing (Heussner, 2019). Although Narrative Design emerged as a new area in the industrial domain of digital games, it did not arise in an isolated way, since much of what is part of the problematic of this design has been discussed over the last 25 years, in the domain of what is called Interactive Narrative or Interactive Storytelling (Laurel, 1993; Murray, 1997, 2005; Crawford, 2004; Mateas, 2001; Frasca, 1999; Juul, 2001; Aarseth, 2004; Ryan, 2003; Ryan & Thon 2014). It was within these areas that our work began (Zagalo, Branco, & Barker, 2003), and that came to enhance the framework of narrative design that we will present.

In 2002 we started an investigation about the narrative convergence between cinema and video games (Zagalo, 2007; Zagalo, Branco, & Barker, 2003), which led us to participate in the European project INSCAPE (2004-2008)¹. In this project we came to identify the lack of specific emotional elements in the dramatization of interactive stories (Zagalo, Torres, & Branco, 2005), which would be cited by the creator Jenova Chen (Fullerton et al, 2006) while making his master thesis prototype “Cloud”, where he sought to instigate feelings of tranquility in his prototypes, and later went on to create commercial games that were successful in producing this emotion, e.g. “Flow” (2009) and “Journey” (2012). We kept on improving our work and in 2006 we presented a proposal for a design model that we called “passive

interactivity” (Zagalo, Torres & Branco, 2006), in which we defended essentially the need for the virtual characters to present in their body language a closer relationship, namely by the virtual touch between the characters. This approach was to be followed in another commercial video game from 2010 (“Heavy Rain”) and we later demonstrated how it had been applied (Zagalo, 2017).

By presenting the development of Narrative Design and Interactive Storytelling domains, we are not saying that stories in games were only being developed when people started discussing these concepts. Games like “Colossal Adventure” (1976) and “Zork” (1979) are the great precursors of all these discussions in the industry and academia. However, we can observe a great difficulty in putting together stories and games throughout the history of video games development. In the 1980s and 1990s, we had Graphic Adventures which moved from the text merely into the use of audiovisual representation, putting much more pressure on the design and sending most of the story exposition to non-interactive cutscenes. At the same time, we had RPGs (Role Playing Games), born from tabletop Dungeons & Dragons, struggling with the density of parameters, a mathematization of the human relation which does not combine naturally with the organic needs of stories. And this explains why in the beginning of the 2000s academia started its interest in studying the problems of combining games and stories and looking for different creative perspectives to approach the subject.

In FlavourGame the interactive narrative approach *per se* was no longer enough, we needed to consolidate an experience that would have to be simultaneously narrative and game and that is how the “Beats & Units” framework (Zagalo, Cardoso, & Oliveira, 2021) presented in this article emerges.

We have to mention that this framework has not only emerged through previous work in the field of interactive storytelling,

¹ INSCAPE - Interactive Storytelling for Creative People, (EC FP6 - IST - IP - 0041500).

but is also the result of a whole work of surveying the state-of-the-art, and plenty of experimentation, with trial-and-error analysis, in the creative development of the FlavourGame project. From our first survey on narrative design (Bryant & Giglio, 2015; Grip, 2014; Swords, 2020), a number of issues and problems (Abernathy & Rouse III, 2014; Claussen, 2017; Maggs, 2016; Szczepanski, 2017) immediately stood out, with the big issue evidencing itself in much the same way as the problem we were struggling with in the FlavourGame project: the lack of a model that would allow the narrative creators to analyze, understand and work the narrative flow throughout the game experience.

In order to introduce the framework, we will therefore begin with a brief discussion of the state-of-the-art in approaches to narrative design, after which we will present the process of the creation of the framework, explaining and detailing it on two levels: conceptual and design. At the conceptual level, we will look at all the information elements that underpin the story world - the nexus; and the mental storyline that is expected to be created in the players' minds - the fable. In the second level of design, we will see the creation of the game mechanics and storyline. The framework is then demonstrated in terms of its functionality, by means of a design map that organizes the entire game and narrative experience according to a set of narrative design descriptors: narration/ description, setting, characters, events, and player. It is this final mapping that allows, on applied terms, developers to manage the intention of the story in the game, namely by adjusting flows and meanings to ensure the coherence of the narrative experience.

2. State-of-the-Art

The design of games, despite dealing with systems, rules and logical environments, still struggles with problems, namely in the absence of standardized methods (Neves & Zagalo, 2021). One of the most discussed models in the field of Game Design is what has been referred to as Game Design Document (Rollings & Adams, 2003), which can assume the diverse structures (Brathwaite & Schreiber, 2008; Fullerton, 2014; Schell, 2008), from a simple description of game elements and some graphical sketches of the art, to the use of flowcharts, user flows, task flows or wireflows (Laubheimer, 2016), or moving diagrams created in software packages like *Machinations*² (game logic test systems). So, when we try to define a game system that not only has to create a balanced experience – with resources suitable to the player and to the game, guarantee the maintenance of players' interest, attention and motivation – but also has to tell a story, that can engage players in meaning – through cause-and-effect metaphors – everything gets complicated.

For that purpose, it is very common to see Aristotle, Freytag, Todorov or Campbell being evoked, however all these authors only dedicated their work to the analysis of non-interactive narrative experiences. In contrast, In the last few years, we have witnessed an emergence of approaches to story design based on idea generation systems, like *Story Dice*³, or modular narrative experience construction systems, like *Fabula Deck*⁴, *Author Tool*⁵ or *Story Mapping*⁶, being the latter story-telling systems, they can be seen as more easily connectable with game design systems.

2 *Machinations* can be accessed at: <https://machinations.io>

3 To know more about *Story Dice* visit <https://davebirss.com/storydice-creative-story-ideas/>

4 To know more about *Fabula Deck* visit <https://fabuladeck.com>

5 To know more about *Author Tool* visit <https://www.beemgee.com>

6 To know more about *Story Mapping* visit <https://craft.io/features/story-mapping>

In a different logic, beyond mere mapping, already pointing to narrative “engines”, we also had some evolution, with the best known being Twine⁷, but limited because it is exclusively aimed at interactive fiction, as well as Inkle Writer⁸. Perhaps, the most developed engine we have identified to date is Articy:Draft⁹, which has been trying to fulfill a gap in the lack of tools for narrative designers, but it resides more in the domain of the tools for production of final artifacts, being less dedicated to the initial creative process, the conception phase of idea generation and search for connections between the game and the narrative.

Thus, in recent years, the Game Developers Conference, and namely its Narrative Summit, have been the scene of many discussions around narrative design, with proposals emerging from various developers, such as Jurie Horneman defending the “mechanical (abstract)” and “fictional (meaningful)” as being “two sides of the same coin” (Horneman, 2015), Chris Bateman with the need to “think of story as one more game system and they’ve all got to work together” (Batchelor, 2019), or Brooke Maggs separating the “characters motivation” from the “players motivation” (Maggs, 2016), or even Amy Claussen defending the linearity of narrative game systems (Claussen, 2017). All these ideas present philosophical dimensions of narrative design in game, which serves the discussion, but are yet too abstract, more focused on limitations and possibilities, and less on the concrete work of creation.

Focusing on more concrete methods, we highlight three. The first is Thomas Grip’s 4-Layers stated as a new “narrative design approach” (Grip, 2014), which is the method used by Frictional Games to develop the videogame SOMA (Grip, 2015). The method is presented with the four layers — gameplay, narrative goal, narrative background, and mental modeling —, with interesting descriptions, offering some access into how

the team designed the narrative within the game, but in fact the descriptions are very little detailed in terms of the creative process, with no information on the different parameters of each layer. However, more recently two other quite more promising methods have been presented, as they are more explicit and detailed: the “Pyra-grid” (Bryant & Giglio, 2015), and the “Forest Paths” (Swords, 2020).

Robert Denton Bryant and Keith Giglio (Bryant & Giglio, 2015) present the method called Pyra-Grid, which is constituted by a pyramid to support an “interactive narrative” that the authors define as a kind of “3D storytelling” (Bryant & Giglio, 2015). They start by proposing a linear structure — in three acts, with the central one divided into two mirror moments — and propose the use of their pyramid to open the linear structure to interactivity, and thus create a story world with 3 dimensions: the “Who”; the “Where” and the “What”. It is from these three questions, that the pyramid instigates new questions that lead the creator to deepen the conceptual definition of the characters, the world and the plot.

Alexander Swords (2020) presents Forest Paths, which focuses specifically on the character or protagonist of the game in order to be able to link his story with his actions inside the game. As such, it presents a bi-pathed matrix, in which 1) the story is defined by the characterization of what the “Player” “Performs” and “Manages” to “Overcome” and “Achieve” the end; and 2) the playable world is defined by the “<character>” with its “<actions>” and “<resources>” as well as in the “<obstacles>” that prevent it from reaching the “<objective>”.

Both Bryant and Giglio and Swords’ methods offer good results, but from our point of view and considering our creative needs, they are incomplete. The first one focuses on an approach of the story for the game, while the second one starts

7 To know more about Twine visit <https://twinery.org>

8 To know more about Inkle Writer visit <https://www.inklestudios.com/>

9 To know more about Articy:Draft visit <https://www.articy.com/en/>

from the game to the story, both being too attached to the starting points, making difficult the following stages of the process in which it is necessary to deepen what the story is made of, or what the game is made of. Still, they are relevant models and are part of the proposal we will present below, which we have been using more recently, as we will see in the next section.

Figuring out which should come first, story or gameplay, is an old discussion, in which some authors defended story as the dominating element of a game (Church, n.d.) while many others stated that the creative genesis of great games starts with gameplay with story being added a posteriori (Bryant & Giglio, 2015). With this in mind, and as in all the arts, it is our opinion that we should not obsess over a flow of actions, even less make it mandatory, but rather understand the great variety of creative processes, and seek flexible tools able to adapt to such fluidity.

3. Presentation of the narrative design framework: Beats&Units

The Beats&Units framework is a tool that allows narrative designers to adjust, adapt and shape the narrative and the game. It is an instrument aimed at the ideation of the development of narrative design in game environments. The framework (Table 1) is organized in two levels: the operational level and the informational level. The former is where we can work to build and integrate the narrative with the game – where we set the Beats –, and the latter in which we can set all the information about the story and the game – where we define the content of the Units. The two levels are subdivided into a sequence of four sub-levels which in the end offer 7 layers:

- the conceptual layers, in which layer 1 is focused on the basic framing of possibilities of meaning of the project, and layer 2 aims at the mechanics, and layer 3 determines the narrative structure;
- the design layers, in which layer 4 inspects the gameplay, and layer 5 the game plot;

- the units layer, which expands and details the units of narrative;
- the surface layer, which is the tool that results from all the other layers and can be used independently of all the others to manage the narrative flow.

Table 1
The Beats&Units framework.

Operational level	Surface	Layer 7 – Beats
Informational level	Units	Layer 6 – Units
	Design	Layer 5 – Game plot
		Layer 4 – Gameplay
	Conceptual	Layer 3 – Story (Fable)
		Layer 2 – Mechanics
Layer 1 – Intent (Nexus)		

3.1 Conceptual sub-level

The ideation process (conceptual sub-level) begins with the Layer 1 (Intent), which is based on Aristotle’s elements of circumstance – the know scheme: Who, What, When, Where, Why and How. These elements serve as the basic framing of possibilities of meaning of the project, delimiting the scope of the game and the story, as Cicero stated: “the narration consisting of these elements will be able to be like the truth” (Sloan, 2010). As can be seen in Table 2, each of the circumstances is defined according to the project’s intent. Still disconnected from the game and the narrative, this layer is important to ensure that the ideation process is not disconnected from the game’s intention, see Table 3.

Once the project’s intent is defined, the issue about where to start arises: mechanics or the story? Over the last few years much has been discussed about the need to create the game’s mechanics from its story, in order to ensure they are meaningful (Brathwaite & Schreiber, 2008). However, considering the confrontation with the practices of creation (Bryant

Table 2

Layer 1 – Intent (Nexus), following Aristotle (Sloan, 2010).

What	Who	Where	When	How	Why
What is the main question that the artifact tries to answer	To whom the artifact is addressed	Place/environment where the artifact is shared	The moment when the artifact is transmitted	The way the artifact answers to the main question	The reason why the artifact is created

Table 3

Layer 2 – Mechanics, following Schell (2008).

Space	Objects	Actions	Rules	Competences	Uncertainty
Space is where the game take place (both virtual and physical)	Objects are anything that can be seen or manipulated in the game by the player	Actions are how the player interacts with objects and can lead to strategies	Rules command the game environment. They define the space, the objects, the actions, and the goals	Competences are physical, mental and social abilities used by a player to progress in the game	Uncertainty adds variability to the game experience, increasing replay value and diversifying the gameplay

& Giglio, 2015), and even from the processes explained by Romero in her presentations (Romero, 2011), we can also understand that a story in a game cannot be created if there is no set of mechanisms to support it. In a similar way that the experience of stories requires a three-act structure, a game requires mechanics, without which it does not exist.

Layer 2 (Mechanics) follows Schell's work (Schell, 2008), restricting mechanics to six components: space, objects, actions, rules, skills, and uncertainty, as shown in Table 3. We can say that uncertainty is perhaps the most relevant mechanic of all because it defines not only the great goal of the game, but also what is at stake for the characters and the plot of the narrative.

Although we start by conceptualizing the mechanics, when passed from the abstract to the specifics of the game, they require a world, a concrete space where everything happens. Thus, at the same time that the mechanics are outlined, the process of projection of the game-world is also initiated from the intentions inscribed in Layer 1, which in turn fuel the construction of the components of Layer 2.

Thus, after setting up the game world, the process of imagining a story that inhabits it begins. For that purpose, Layer 3 (Story) invokes Todorov's structure (Todorov & Weinstein, 1969), which defines narrative structures in 5 elements: equilibrium, disruption, recognition, repair, and new equilibrium, see Table 4. This structure allows us to quickly enter the outlined imaginary world and start from the natural state of that world to propose different disruptions in it, until we find one that matches the game's intent.

Table 4

Layer 3 – Story (Fable), based on Todorov (Todorov & Weinstein, 1969).

Equilibrium	Disruption	Recognition	Repair (Action)	New Equilibrium
In the beginning of the narrative there is an equal balance and initial equilibrium	The initial equilibrium of the narrative is disrupted by an event	In this stage there is the recognition that disorder and disruption has occurred	There is an attempt to repair the damage done by the disruption	A return or restoration of a new equilibrium at the end of the narrative

3.2 Design sub-level

In order to start the connection process between story and game, Layer 4 (Gameplay) resorts to the Forest Paths method by Alexander Swords (Swords, 2020), which proposes to model a pattern between the character’s story (light green in Table 5), and the player’s actions (dark green in Table 5) to deepen the characters’ definition inside the game. Thus, as can be seen in Table 5, we have a starting point that is the player, and a finishing point that is the goal, and in the middle is where the game process is developed, which guarantees the player’s involvement with the story world.

Up until Layer 4, we have the story that we want people to retain in their heads, a fable, a mental creation developed by the players. However, that is different from the artifact that stimulates the fable itself. In this sense, Layer 5 (Game plot) takes Todorov’s structure Todorov & Weinstein, 1969) (see Table 4) and adapts it to Freytag’s (1864) (see Table 6). It re-organizes the information in time, abandoning the chronology of the story, to make room for the plot and therefore bring about the experience of a story. In other words, a succession of events is not enough, we need the causality of these events to be managed in time in order to build a flow of narrative experience. This flow is produced by creating a rhythm in the information that is unveiled at each moment, in order to produce

Table 5.

Layer 4 – the Gameplay, following Swords (2020).

Player	<character>	Performs	<activities>	Manage	<resources>	Over-come	<obstacles>	Achieve	<goal>
	Which character is represented by the player		Which activities are performed by the player during the gameplay (e.g. move, attack, negotiate)		Which resources are managed by the player during the gameplay (e.g. energy, powers)		Which obstacles are overcome by the player during the gameplay (e.g. enemies’ energy, battles)		Which goals are achieved by the player during the gameplay (e.g. eliminate enemies, acquire powers)

Table 6
Layer 5 – Game plot, following Freytag (1864).

Exposition	<back story>	Rising action	<threat>	Climax	<confrontation>	Falling action	<fall>	Resolution	<theme>
	Background information of the plot that includes characters and setting	Major events that add tension or suspense to the plot (problems or conflicts) that lead up to the climax			The culmination part of the plot. The turning point for the protagonist's character		Events that unravel the conflict between the protagonist and the antagonist that leads to the resolution		Events from the end of the falling action to the actual end of the story where the problem or conflict is resolved

curiosity in the receiver, an interest in wanting to know more about what is going to happen next, following in the attempt to be able to interpret the missing information (Eco, n.d.).

3.3 Design sub-level

The units layer (Layer 6) follows previous theoretical work (Zagalo, 2019) indicating the characters, setting and events as the core units of narrative design. However, when applying it we realized that by following this path we would not be able to account for player participation, as evidenced by Swords (2020). As such, we needed two more units: the player and the narration, resulting in a set of 5 design units, as presented in Fig. 1. With these 5 units it becomes possible to start to put into perspective the design of the narrative and game experience, to understand how each unit affects the others, namely to understand how the player engages with each unit, however it still lacks a temporal notion.

And so, it does not serve the process of iteration and improvement that is needed to operate in the relationship between story and game. Across the 5 units, it is not only possible to understand how the experience is produced throughout the game, the moment-by-moment of the experience being produced, and understanding the peaks and lows of tension we're looking to introduce to guarantee engagement. In this sense, the framework that has been presented so far, in its

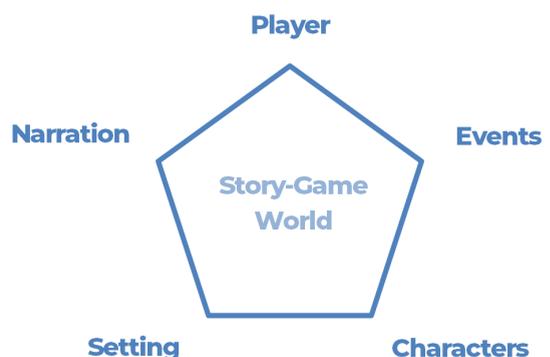


Fig. 1
Layer 6 – Units.

6 layers (informational level), has as its object not only the sustainability of the structure, but also demonstrates that the framework, being too complex, requires simplification in order to become applicable in the creative process.

3.4 Surface sub-level: beats

The surface sub-level emerges from the result of the previous layers and takes the simplified shape of a set of cards in which every card (Fig. 2) represents a Beat (Layer 7), which is constituted by Units, being part of a Scene of experience. In this narrative design canvas, these three elements are used just as in the domain of scriptwriting (McKee, 1997) for designing and managing experience information:

- Scenes are sections and serve to frame concrete moments in which something happens, the so-called conflicts or incidents that produce perfectly delineable and autonomous spaces of information. Each can only be set in one scene.
- Beats are actions, and they serve in breaking scenes – story or game – into smaller structural units. McKee defines Beats as “an exchange of behavior in action/reaction” (1997). Importantly, the changes in behavior may concern what the characters do or what the players do. In this way, Beats serve as pace markers regardless of whether they are story or game.
- Units subdivide each Beat, in the Scene, into 5 elements (Fig.1). This is perhaps the most relevant element of the construction of the entire framework, as it demonstrates how the generalization of story units, while serving the understanding of the narrative, do not suit the design of the experience, as changing a single unit in each beat can transform the entire experience:
- Narration is about the scene’s information in each beat. We define it as narration, since the information in each beat must be worked in function of its provenance, whether of the characters, the game or the players;
- Setting refers to the place in the game, the place in the story;
- Characters/Dialogues relates to who is in the portrayed moment, including dialogues and voice overs;

- Events describe the actions of each element in the Beat;
- Player is aimed at what can or should the player do.

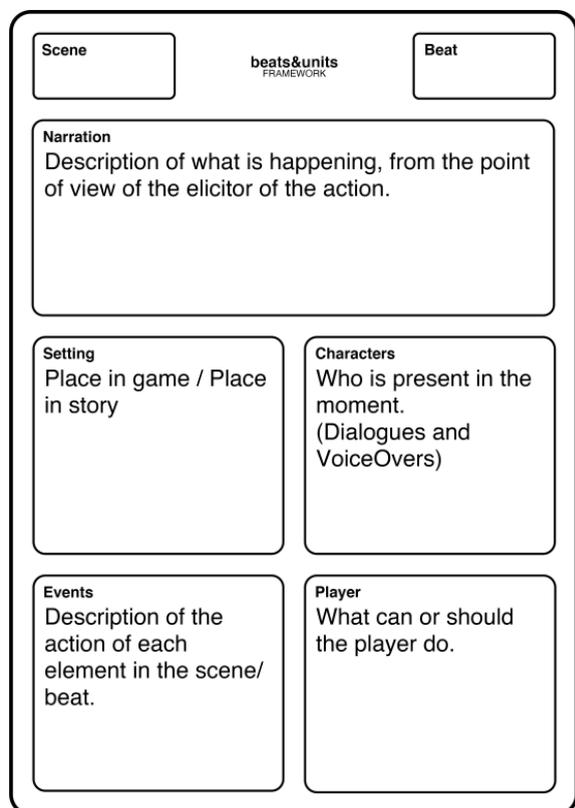


Fig. 2
Layer 7 – A Beat (card).

In fact, each card represents a Beat in a particular Scene. Each Scene can have multiple Beats. The cards, being Beats, assume the role of building blocks of the game’s narrative relationship with its gameplay, and they can be combined to form linear or multilinear sequences of events. There are no fixed numbers of Scenes in the game or Beats per Scene (Fig.3).

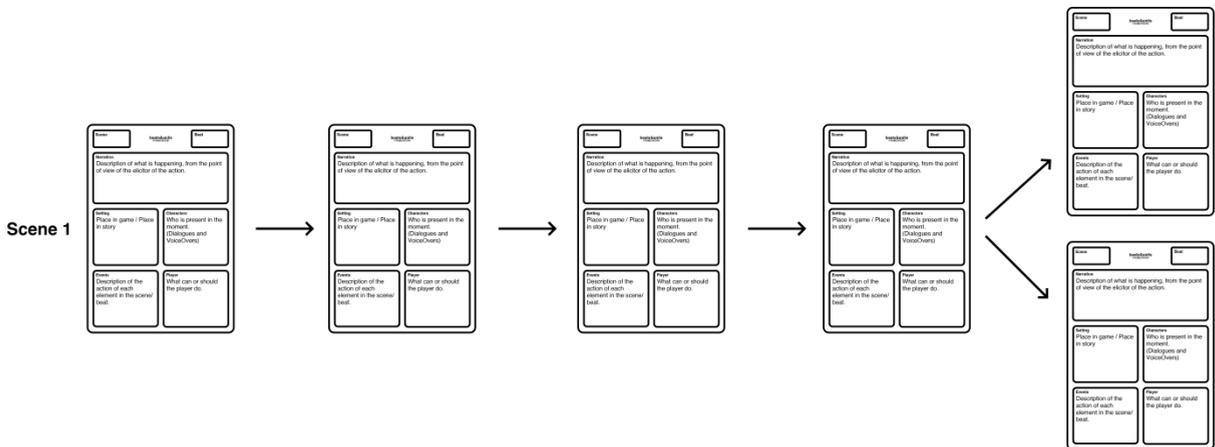


Fig. 3 Each card represents a beat. By interconnecting the Beats, one can work on flow, pacing and balancing in linear and non-linear sequences of events.

4. Conclusion

The Beats&Units framework has been used within the FlavourGame project and the main findings from its use are: i) speeds up the understanding of the game and story experiences by turning abstract information into concrete visual formats; ii) allows developers to be able to understand what the player knows and does not know about the game and the story, at any given moment; and iii) makes it possible to assess the evolution of each character in the perspective of the player, to measure the narrative progress, to understand the positioning of moments of tension and pause, and thereby adjusting the progress of the game with the narrative progress.

This framework is a tool that defines the fundamental information to be offered immediately before the start of the game, as well as the information to be introduced throughout the game. The goal of any game lies in its interaction, so we cannot continuously stop the game to tell the story in non-interactive ways (the so-called cut scenes), we need to

work the different modes of narrative exposure that the game world allows, from the dialogues to the objects present in the scene – e.g. cards, clothes, inscriptions in places, etc. – in order to introduce the information that allows the evolution of the characters and the narrative progress.

Thus, the tool has been very useful in determining the full range of information-carrying elements to be conveyed by the game and allowing us to work on the flow of the experience, namely speeding up, slowing down, adding or cutting narrative exposure.

We consider that the tool has delivered as expected, in terms of supporting the creation and management of narrative design. Naturally, for larger projects, it might be necessary to take the structure and apply it in a programmable environment, which could offer us links between cells, transportation of variables, as well as incorporating dialogues and actions directly into the final implementation of the game. However, we consider that in this step we would already be closer to a game engine, and less of a narrative design tool.

We already had the opportunity to carry out a first exploratory workshop about the use of this framework with around 12 specialists and developers. In the workshop we were able to model the narrative information with the gameplay, which suggests to us that this framework can bridge the narrative and ludological components of a game. Since the focus of the framework is on ideation and conceptualization, and not on development and implementation, its use can be discerned when a game starts being developed. It is, of course, in our interest to assess players' experience with the games and interactive stories created with this framework. However, since the framework's foci are foremost centered in the poietic process rather than on the esthetic and aesthetic processes, its validation was firstly accomplished via who studies or conceives the game and the story rather than with who plays it, with the aim to develop insight of how easy, friendly and accessible to use the framework is, and how it empowers the creativity of interactive storytellers and designers.

The Beats&Units framework is a process in continuous development and that is why we are experimenting and uncovering new grounds and applications to use the framework in each iteration. In specific approaches we introduce some variations, in others we suggest merely different uses. We intend also to benefit from the interaction with other frameworks, like "The Bottom-Up And Top-Down Approaches" (Kuhnen, 2007). Nevertheless, the framework is sufficiently stabilized and usable, and it works, as already identified in the exploratory workshop where participants used the framework to create their game ideations.

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