The User-Focused Storybuilding Framework for Competence Developing Games

A Design-Framework considering the basics of an educational game's story

Johannes A. König, Veronika Völker, Martin R. Wolf
Lab for IT Organization and Management
Aachen University of Applied Sciences
Aachen, Germany
email: koenig@fh-aachen.de, veronika.voelker@alumni.fh-aachen.de, m.wolf@fh-aachen.de

***Abstract*—During the development of a Competence Developing Game's (CDG) story it is indispensable to understand the target audience. Thereby, CDGs stories represent more than just the plot. The Story is about the Setting, the Characters and the Plot. As a toolkit to support the development of such a story, this paper introduces the User-Focused Storybuilding (short UFoS) Framework for CDGs. The Framework and its utilization will be explained, followed by a description of its development and derivation, including an empirical study. In addition, to simplify the Framework use regarding the CDG's target audience, a new concept of Nine Psychographic Player Types will be explained. This concept of Player Types provides an approach to handle the differences in between players during the UFoS Framework use. Thereby, this article presents a unique approach to the development of target group-differentiated CDGs stories.**

Keywords-CDG; Competence Developing Game; Serious Game; Video Game; Story; Narrative; Player Types; Player-Types; User-Focused Storybuilding Framework; UFoS.

I. INTRODUCTION

Recently, games have become more and more important for serious education in private or business situations. Entertaining gaming situations are inherently motivating and, as such, could be utilized to deliver a specific message to their audience in an entertaining way [1]. For this purpose, not only business simulations (often board game based) are in use, also video game based solutions (e.g., serious games) are common. Every game with a serious intention, regardless if it is a video game or a board game, can be described as a Competence Developing Game (CDG). In detail, a CDG is characterized by the endeavor to teach its players a competence and utilize the motivational and entertaining nature of games to do so [2].

Zyda [3] refers to "Bing Gordon, chief creative officer of video and computer games developer Electronic Arts […] [who] defines video games as 'story, art, and software'" [3]. The first aspect 'story' distinguishes between a board game or a business simulation compared to a video game based CDG. Here, a video game tells a complex continuous and sometimes changing story presented by technology. Meanwhile, a board game or a business simulation presents an often minimalistic story using printed game material or a facilitator. Nevertheless, Ritterfeld explains that the quality of a game with a serious intention has to be similar to an entertainment game to be successful [4]. The other two aspects 'art' and 'software' are comparable in their roots. Art, for instance, includes the visuals of a game. Software may pertain to executable files, but for board games it can be understood as resource to create the cards, board, etc. Art and software need to be implemented by a development team. To do so, the team needs tools. In the case of video games, the team uses programming languages to produce a new piece of executable software. Board game developers use physical materials to create a touchable and playable game. Consequently, only the game's story differentiates deeply between analog and digital games. By that, story is one of three main game components and the only component that differs greatly between the game types under the CDG umbrella term. Because of that, an explicit CDG story Framework is useful. There are different approaches for story development (see e.g.: [8][14][16][18]), but there is no approach that was developed specifically for CDG story design so far.

Story, in fact, is one of the key components of video games [3]. It creates background information and context for many of the actions taken within a game. It can also serve as a motivator and a means of maintaining interest in the game and understanding of the sequence of events occurring within it. Therefore, story should be crafted to compliment the rest of the game. Also, in CDGs, it supports and underlines the serious intention and connects with the audience. To support a CDG's developer to design a story in a standardized way, this paper presents the User-Focused Storybuilding (short UFoS) Framework for CDGs.

The Framework thus supports the development of the game story on paper. By that, the UFoS Framework has to be applied before using game engines like Unity [23], Unreal [24] or their board game equivalents. The result of this application can even support to decide whether a video game based CDG, a board game based CDG or a mix up will be the best choice.

The structure of this paper will be as follows: In Section II of this paper, the Framework itself with all its components will be explained, elaborating its content and visual representation. Section III will provide an overview and explanation of the Nine Psychographic Player Types, placing a focus on the psychographical attributes of a Player. Section IV explains how to apply the Framework as a development tool for the basic elements of a story. In Section V, the derivation of the Framework will be discussed, examining how its components were chosen and designed and why those particular components belong to the Framework.

 ISBN: 978-1-61208-616-3

Section VI seeks to explain the origin of the Player Types, including the taxonomies used to craft the different categories and the process of developing them. Section VII concludes the paper by examining the need for further research and the possibilities and advantages of the UFoS Framework.

II. THE UFOS FRAMEWORK

The UFoS Framework serves as a guideline to create the basics of a CDG's story that can motivate players. It entails six components (Serious Content, Plot, Characters, Setting, Presentation, and Player), which are examined individually in the process of story creation. Therefore, these six components cover all aspects of a video game-based CDG's story. In the following paragraphs the components are briefly described (for the Framework derivation see Section V).

The first story component is the **'Serious Content'**, based on the word 'Serious' in the 'Serious Game' term. This aspect deals with the intention behind the game. It is usually one of the first elements to be described in the process of developing a CDG [5]. The Serious Content describes the real life problem that the game is attempting to solve. The competence the game is aiming to teach is derived from this. The Serious Content is the game's purpose and its primary focus and, as such, other components of a CDG have the objective of underlining it. The next story component is the **'Player'**. This component covers the audience of the game. It is different from the other components, as it is the only element that the designer cannot create but merely describe. The Players exist independently from the game, whereas every other element does not. The Player is defined by two different parts: *'Demographics'* and *'Psychographics'*. Demographics describe external attributes, such as age and gender [6]. Psychographics describe inner attributes, such as preferences or life styles [6].

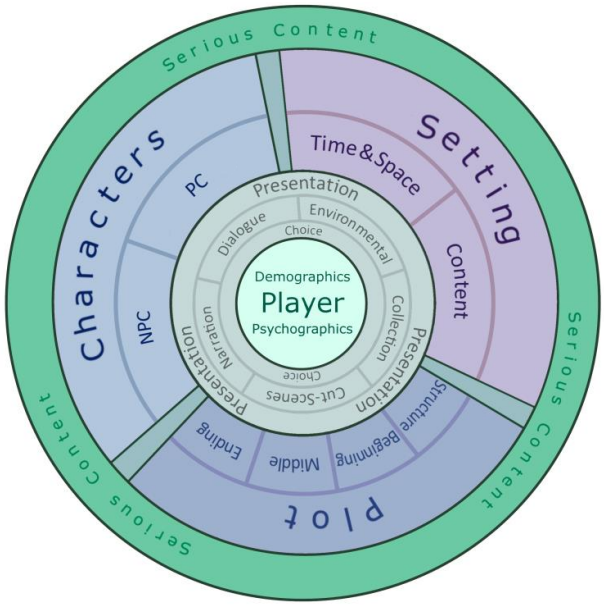

Figure 1. The UFoS – Framework for CDGs

Both parts need to be considered when describing the Player as both influence how a game story is designed. Additionally, understanding and describing the Player will enable the developer to craft a powerful gaming experience for their specific target audience. The whole story of a digital CDG serves as a bridge between the components 'Serious Content' and 'Player'.

The three components in between are the Plot, the Characters and the Setting. These components are the heart of every digital CDG's story. The amount of influence they have on the whole story varies depending on the nature of the components 'Player' and 'Serious Content', as will be discussed later (see Section IV).

The **'Plot'** describes the sequence of events happening in the game. It starts with the beginning of the game and ends with its conclusion. As seen in [7] and [8], the Plot has an overall *'Structure'*, as well as three parts: The *'Beginning'*, the *'Middle'* and the *'End'* [7][8].

The **'Characters'** are the entities living within the game. These are separated into the *'Player Character'* (PC), an entity controlled by the player to navigate through the game; and the *'Non-Player Characters'* (NPCs), entities controlled by an Artificial Intelligence [7][9]

The **'Setting'** describes the *'Time & Space'* of the game. This can be very realistic or very unrealistic and entail other elements, such as the laws it follows [10]. Time and Space are only the frame conditions of the Setting. Everything else, like its laws or specific areas, are its *'Content'*, which is influenced and defined by those two initial parameters [6].

As already mentioned, the level of influence of the three components depends on the Serious Content and the Player and is individually crafted for each game. This is the case because detailing all elements in the same amount could potentially overwhelm players, especially those who are not willing to invest time and energy into a game story [7]. Therefore, the developer needs to select a focus, which is in line with the determined intention of the game (Serious Content) and, if possible, caters to its target audience (Player). So, the level of detail required for each component varies from CDG to CDG. Therefore, components of a lower priority should also be considered later during a game story development process.

The final component of a story is its **'Presentation'**, also called 'Discourse'. A story's presentation refers to the question of how something is shown within the game [11]. It describes the way how the five previously established components are explained and presented to the Player. The literature describes different possibilities to present a CDG to its players. The decision of the right style of presentation for a specific CDG, again, depends on the intention of the game, as well as the preferences of the target audience.

Presentation is divided into the areas 'Plot' and 'Choice'. Video games provide the player varying amounts of choices; some of them influence the events and some of them do not [6]. Choices can be presented in different ways, ranging from on-screen options to subtle decisions. Different degrees of subtlety can cause different effects, as more obvious choices can be utilized to demonstrate cause and effect and less

 ISBN: 978-1-61208-616-3

visible ones can be exhibit how easy it is to make wrong decisions or miss certain things in some scenarios.

However, keeping the serious mission of every CDG in mind, the different options the player can take have to be considered carefully, because the decision made by a player in the game's world may support building competences the player is able to use in the real world. By that, 'Choices' support achieving the serious mission of a CDG in a very direct manner. Additionally, there a several ways to present the Plot.

A common way of a plot's presentation is *'Narration'*. It is about telling a story via text and speech [12]. Another plot presentation opportunity is *'Dialogue'* [13], a method of conveying information via the interactions between two or more characters in the game, shown with either text, sound or both. An overarching category of presentation deals with visual storytelling. This term describes methods in which, rather than explaining story with words, the audience witnesses the events directly by observing the characters, or is provided with images or other visual cues that deliver context and clue them into the happenings of the story [14]. For this kind of visual storytelling there two more possibilities: *'Cut-Scenes'* (not interactive sequence, breaking up the gameplay) [15] and *'Environmental Storytelling'*. The latter describes a technique which uses certain environmental features to tell a story. For instance, puddles in the street as a signal for rain having fallen [16]. The last plot presentation method is called *'Collection'*. Collection takes place when the pick up or the interaction with a game object triggers a narrative sequence [17], and several of these interactions and triggers exist, or are required to understand the narrative.

The six components are arranged in a circle as their order depends on the CDG's purpose and players and therefore, from a generic view, there is no hierarchy between them. However, the components of the Setting, the Characters, the Plot and the Presentation separate the Serious Content on the outside from the Player on the inside. This is because the Serious Content serves as a frame for the other components, not only determining several of their attributes, but also providing possibilities and limitations to them. The Player, on the inside of the Framework, is the target of the Serious Content, so the components should be designed to allow the Serious Content on the outside to have the optimal way to the Player, on the inside. Figure 1 shows the visual representation of the Framework. The derivation of the Framework will be explained in Section V.

III. THE NINE PSYCHOGRAPHIC PLAYER TYPES

As will be shown in Section IV, there are phases and steps, which support the use of the six Framework components. The Player and their preferences have to be considered. This means that a developer has to make choices that match the likes and dislikes of different Psychographic Player Types.

The Nine Psychographic Player Types are a method of grouping Players of a game by psychographic attributes (for their derivation, see Section VI). They were jointly developed with the Framework and are essential for the application of the Framework as shown in Section IV. The Player Types are:

1. The **Narrator**. This category defines people with a strong interest in observing dramatic sequences of events. They take pleasure in strong narratives and well-written plotlines.
2. The **Challenger**. Challengers primarily play video games for their problem-solving qualities. They enjoy difficulty and examining a problem or puzzle from multiple angles before solving it.
3. The **Socialite**. Socialites enjoy the social aspects of games, such as playing with friends or interacting with realistic Non-Player Characters.
4. The **Explorer**. This group represents people who enjoy discovering things. They thrive on a sense of wonder and act in pursuit of it, exploring and uncovering. This exploration is not limited to areas but extends to the discovery of new methods or abilities.
5. The **Expressionist**. These players play for the chance to express themselves within the game. They wish to have control over what happens and generally influence the game.
6. The **Dreamer**. The Dreamer plays to escape everyday life temporarily. They wish to fully immerse themselves in the game world and become part of it for a while, taking in the various sensations offered by it.
7. The **Daredevil**. These players, like Challengers, enjoy difficult games. However, their motivation to play them is not the careful consideration of problems, but instead the thrill and suspense provided by certain obstacles. They also enjoy Horror games as these are suspenseful and thrilling by nature.
8. The **Winner**. This category describes players who deem winning to be one of their primary goals or their only goal. They also enjoy difficulty in games, as it makes the experience of winning more rewarding. There is less merit in winning something easy than winning something difficult.
9. The **Collector**. Collectors like collecting and completing. This does not only refer to quests or objects in games, but also describes the act of finding or doing everything a game has to offer.

Of course, no person can be described as only one Player Type. Humans' desires and their psychology are far too complex to be labeled accurately with nine terms. Instead of assigning one description to each person, this approach attempts to describe possible motivations while considering that each player falls into different categories to different degrees [6]. For instance, one person may enjoy a strong narrative (Narrator), while also playing the game to escape everyday life (Dreamer) and following the drive to collect everything in the game (Collector). But they despise puzzles (Challenger) and thrills (Daredevil). Each player has an individual profile of Player Types, with some of them being stronger motivators and influencers of behavior than others. A group of people can be defined by their common

 ISBN: 978-1-61208-616-3

predominant Player Types. One person can fall into many categories this way, each of them defined by one of the Player Types that influences them the most. This approach at classifying them acknowledges the multitude of possible motivators and influencers, while also maintaining the ease of identifying people with labels.

It is important to understand which Player Types are predominant in the audience. Due to their different motives, natures and drives, people categorized as different Player Types have different priorities and preferences regarding several elements of a game's design; this includes the story [6], as will be discussed later.

IV. HOW TO USE THE FRAMEWORK

A. General description

In Section III all components of a game story and their positions within the UFoS Framework were explained. In addition, the Nine Psychographic Player Types were introduced, which simplify the Framework application. Now, it is important to understand how the UFoS Framework could be used during the story design of a CDG.

There are different phases in the process of the story development. They all correspond with one or more of the components described in the previous Section. Each phase contains several steps to be followed to create the basis of a CDG story.

The first phase exists to establish the Serious Content which, as previously mentioned, must be determined first to design every other element to underline and support it.

The second phase deals with determining the Player, the audience of the game. It requires a definition of their demographic traits, as well as their psychographic profile, which can include up to nine different psychographic player types (see Section III). This phase has to take place after the definition of the Serious Content, because the teaching goal implies a specific target audience. Sometimes, when a CDG is developed, several of the traits of the Players are already pre-determined (e.g., if the intention is to play the game with employees of a company, they have to be at least 18 years old). It has to, however, occur before developing several of the other components, as the definition of the Player will influence design choices that affect them.

The third phase is used to determine the priorities of the Setting, the Plot and the Characters. As previously mentioned, a developer should prioritize one of the three components over the other two, to focus on that one in more detail. So, the developer should establish a priority list, which includes the components Setting, Plot and Characters. This third phase requires the developer to not only prioritize one component, but to furthermore determine which of the other two is the second and which is the least important, creating a hierarchy. This list is utilized to make design choices and determine the level of detail each component gains in the design process. Since the priorities determine some of the design choices of the other aspects, phase three needs to occur at this time. However, since setting the priorities largely depends on the Serious Content and the preferences of the Player, it cannot take place sooner.

The fourth phase is the largest one. It is about designing the now prioritized components Setting, Plot and Characters. This phase is repeated multiple times. Due to the varying order of the elements, some of the steps may require information from steps or elements that have not yet been developed. In such instances, the developer will have to make a note and move on with the following steps and return to the missing or incomplete ones during the next iteration, to complete them with the information gained and developed within their successor steps. As mentioned, not only their order is determined by the assessment of the priorities, but their level of detail, as well. That does not necessarily mean that the development team cannot give each element a lot of details. It merely indicates how much detail should be actively presented to the Player in the game and how much detail should be relevant and a part of the overall product (this relationship is explained in the second Section of this Section with an example).

The fifth and final phase deals with presentation. Once all other elements have been determined, the developer has enough knowledge to understand in what capacity which things have to be presented to the Player throughout the CDG interface.

Table I shows that each of these phases contains steps describing the precise actions the developer must take. These steps include a brief descriptive title.

Furthermore, there are three pieces of information that are not included in Table I because of spatial limitations: Required internal information, Required external information and the Instruction. The first two columns describe which information is needed to perform the instructions. This additional content can be found in [22].

It should be noted, that the information provided in this paper is not adequate to use the story Framework. If the Framework is to be used, it is absolutely necessary to download the pdf file from [22] and follow its instructions step by step.

As can be seen in the linked pdf document, the actions that have to be taken in each step depend on the Psychographic Player Type the game wants to serve. Therefore, during the use of the Framework (carry out the Framework step by step) it will be necessary to understand the preferences of the CDG's players. This knowledge is required for many steps and displayed in the Framework in the 'required internal information' area. To provide a handle for the different player characteristics, Nine Psychographic Player Types where defined through conceptual and empirical research (see Sections III or V). These Player Types refer not only to digital CDGs, but also to entertainment video games.

 ISBN: 978-1-61208-616-3

TABLE I. THE PHASES AND STEPS OF THE UFOS FRAMEWORK

Phases	UFoS Steps for CDGs
Phase 1: Defining the Serious Content	Serious Content – Step 1: Determine the intention
	Serious Content – Step 2: Define the Serious Content
Phase 2: Defining the Player	Player – Step 1: Demographic Factors
	Player – Step 2: Define the Psychographic Player Type
Phase 3: Determining Priorities	Priorities – Step 1: Set the Priorities
Phase 4: Performing Setting, Characters and Plot	Setting – Step 1: Requirements
	Setting – Step 2: Realism
	Setting – Step 3: Accessibility
	Setting – Step 4: Debriefing
	Setting – Step 5: Simplicity
	Setting – Step 6: Size
	Setting – Step 7: Laws
	Setting – Step 8: Player Influence
	Characters – Step 1: Existence of NPCs
	Characters – Step 2: Character Focus
	Characters – Step 3: NPC roles
	Characters – Step 4: NPC character Profiles
	Characters – Step 5: NPC backstory
	Characters – Step 6: NPC memories
	Characters – Step 7: NPC affective State and Actions
	Characters – Step 8: NPC relationships
	Characters – Step 9: PC observer
	Characters – Step 10: PC grade of Personality
	Characters – Step 11: PC customization
	Characters – Step 12: PC motivations
	Characters – Step 13: PC player Character Personality
	Characters – Step 14: Relationships
	Plot – Step 1: Linearity
	Plot – Step 2: Outline
	Plot – Step 3: Time Constraints
	Plot – Step 4: Serious and Non-Serious Content
	Plot – Step 5: Exposition
	Plot – Step 6: Tutorial
	Plot – Step 7: Hook
	Plot – Step 8: Obstacles
	Plot – Step 9: Plot Points
	Plot – Step 10: Choice
	Plot – Step 11: Impact of Choice
	Plot – Step 12: Illusion of Freedom
	Plot – Step 13: Climax
	Plot – Step 14: Resolution and endings
Phase 5: Defining Presentation	Presentation – Step 1: Plot
	Presentation – Step 2: Choice

B. *Exemplary use*

To illustrate this process, one can examine a fictional example. This will create a better understanding of the Framework use and underline the connections between different parts of the process. The preferences of the Player Types that will be mentioned here are shown in the UFoS Framework document [22].

The fictional example in this case is a CDG that seeks to teach the employees of various companies IT-Security. The game writer, tasked with developing the story, utilizes UFoS.

In Phase 1, they must describe the Serious Content. The description of the project already does this loosely. The Serious Content is IT-Security. However, the game writer needs to define what parts of IT-security the game will entail and which it will exclude. They examine some standards and risks described by the ISO/IEC 27001 and formulate scenarios that will be depicted by the game. Then they continue with Phase 2.

Phase 2 requires them to define the Player. The Serious Content determines some of the demographic traits. Since its IT-Security in companies, the Players have a broad age range from 18 to around 65, are of all genders, and can be at various stages of life. To establish the Player Types within the audience, the game writer conducts a survey questioning the employees of multiple companies. The results e.g., show that the primary Player Types in the target audience are Narrators, Explorers, Dreamers and Winners.

In Phase 3 the game writer has to establish the priorities between the three large components Setting, Characters and Plot. They decide that the most important component to depict IT-Security is Plot, as this entails showing behavior and consequences. In IT-Security this means showing what type of behavior can lead to security breaches. The preferences of the Narrators, Explorers, Dreamers and Winners underline this decision. The game writer is unsure which to set as second most important component. The Setting can provide themes of environmental security whereas Characters allow dealing with social engineering. Because Explorers prefer Characters over Setting and the other Player Types are indifferent, the writer selects Characters.

Phase 4 deals with the three large components. First, the game writer writes the Plot, as this is the component they prioritized. They write a basic outline for the Plot in which a group of people has to master IT-Security to overcome some large obstacle. They realize that they need to establish the Setting to get into more detail. They match the Plot to the time constraints, decide on a pattern to include Serious Content and write everything, keeping IT-Security and the preferences of the Player Types in mind. Next is the design of the Characters. The game writer decides to include NPCs, as Characters is of the second highest priority and IT-Security can benefit from it. Additionally, all of the found Player Types enjoy them. For social engineering, a part of IT-Security, the game writer places the focus on the NPCs. They then write characters that match the requirements posed by the Serious Content, the Player Types, and the Plot. The Plot, for example, demands that certain people exist to carry out certain actions, which are roles that the game writer has to consider.

Once the Characters are developed, the game writer deals with the Setting. They decide to set the story in a spaceship in the future as this is a topic all people of the target audience understand. Also, it can portray all needed elements of IT-Security (e.g., technology, etc.). After the Setting is developed, they go back and fill in more details in the Plot, such as describing which NPC is used in which situation and what elements of the Setting are employed in which way. Once all Steps are finished, Phase 4 is concluded.

In Phase 5 the game writer decides to present the Plot via Cut-Scenes and Dialogue, as these methods cater to all Player Types in the audience.

 ISBN: 978-1-61208-616-3

The game writer documents all their decisions in one comprehensive document, creating the basic story of their CDG.

V. DERIVATION OF THE FRAMEWORK

The Framework is based on the previously explained components of story. These were derived by examining a list of elements of story and modifying it to be simpler and to meet the requirements of an interactive medium. The initial list of elements consisted of 11 elements found and arranged by Miller, director of the World Storytelling Institute [18]:

1. "Characters (decisions and follow-through)
2. Place
3. Time (continues, or jumps, flashbacks?)
4. Storyline (also known as, plot).
5. Sensory Elements: Smells, Flavours, Colours, Textures, etc.
6. Objects. Such as: Clothing. A costume. A piece of fabric.
7. Characters' physical gestures, and attitudes.
8. Emotions in the story (for the characters, the teller, and the listeners).
9. Narrator's Point of View. (Who is telling the story? […])
10. Narrator's Tone of Voice, Attitude, Style (casual, formal, other?).
11. Theme (Meaning, moral, message, idea)." [18]

This list was selected as a starting point, as Miller is a very credible source. Additionally, his list entails several steps that were only partially covered in other lists and sources. This list is altered in the following paragraphs, as it only matches stories in general not stories in CDGs, specifically.

Several of these elements can be combined into one, more broadly defined element. The first element, Characters and the seventh element Character's physical gestures, and attitudes, can be merged into one bigger element of Characters with all their traits and behavior. The elements place and time can be combined in one element Setting. This also seems to be important, since the state of a place can only be described under the consideration of time.

Miller understands the Storyline as a sequence of events, that occur within the story [18]. To reduce misunderstanding between storyline and story, the term Plot will be used instead.

Sensory Elements are stimuli which affect the audience [18]. But usually, the development of these kind of elements is task of other departments than the story department [7]. For that reason, they do not occur in the actual story developing process, so that they are omitted for simplifying reasons.

Objects are things that appear in the Plot or the story [18]. They do not add enough to the whole story construct to process them separately.

The following two elements: Narrator's Point of View and Narrator's Tone of Voice et al. will also be summarized under the element Characters. This is because a distinction between two types of Characters can be made: The PC, an entity controlled by the Player, and the NPCs, characters who are controlled by Artificial Intelligence. The elements pertaining to the Narrator are included in the definition of the PC, as their perspective determines the audience's point of view, and their comments, attitude etc. (see [9]) reflect a narrator's tone of voice.

The eleventh and final element is Theme. Theme is described as a combination of the preceding ten, it is the driving force behind the game [18]. In a CDG this driving force has to be the Serious Content of the game and as that it will be maintained.

By shortening the list in that way, it will be easier for the developer to work with and understand the elements. The resulting list looks as follows:

1. Characters
    a. Non-Player Characters
    b. Player Characters
2. The Setting
3. The Plot
4. Serious Content

As shown, these elements cover a whole CDG story. By that, they shape the base of the UFoS Framework as shown in the Sections II and III and represent four of the six Framework components. Beyond these elements, the center of the UFoS Framework consists additionally of the components Player and Presentation. The following Section explains the derivation of this both components.

Miller wrote about Story and Storytelling in general. In addition to his definition, some elements that are not part of traditional storytelling must be considered when dealing with CDGs or video games in general. While each story requires a form of presentation, games are one of the only mediums with as many different possibilities of presenting story as they have.

One of the missing components is the Presentation of a digital game story. There are several ways to do so, the possibilities are hardly limited. This fact is e.g., shown in the 'Preverbal phenomenon'. This phenomenon is based on the consideration that a narrative can be understood without the use of language [11]. By that, every element inside a CDG can contribute to the whole game story construct, but it does not necessarily have to. Of course, it is not possible to cover a huge amount of story presentation methods, but to assist a story developer at work the UFoS Frameworks deals with five common plot presentation methods: Narration [12], Dialogue [13], Cut-Scenes [14], Environmental Storytelling [15] and Collection [16], which were already explained in Section II.

Another aspect of a game story presentation is that game stories are not static. In interactive media, as opposed to books or movies, the audience has the possibility to influence the course of events happening in the game.

To provide interactive content to the player, games offer 'Choices' e.g., in form of several textual options on screen or by putting the player in an open world, allowing them to do whatever they want [6]. Of course, this kind of freedom has to be considered during the story development. A game designer has to be sure that the story is presented in the right sequence and that every path of the game leads to a consistent story. In a dynamic game environment these

 ISBN: 978-1-61208-616-3

conditions result in very high requirements on the story presentation. Choices have to be considered during the whole game development to perform well during the story presentation. For the above reasons, as part of Presentation, Choices have been included in the Framework, to ensure the timely integration into the story development process.

The other missing component is the Player. While every medium has an audience, interactive media needs to consider it more strongly as the player has to play to drive the story forward and has to be invested in the gameplay. Because the story aspects of gameplay are presented through the Setting, the Characters and the Plot, the Player should be considered while developing these components. Therefore, these three elements are the most vital as they make up the true content of the story. The Player, represented by the Psychographic Player Types, was integrated into the Framework, too. The derivation of the types is explained in the next Section.

1. Serious Content
2. The Player
3. The Setting
4. Characters
    a. Non-Player Characters
    b. Player Characters
5. The Plot
    a. Choices
6. Presentation

VI. DERIVATION OF THE PSYCHOGRAPHIC PLAYER TYPES

In this Section, it will be explained how the different Psychographic Player Types were created and what taxonomies were examined in order to do so. Understanding what the Player Types are and how their traits were defined aids in understanding Players and their desires as such, since the derivation provides insights into several attempts at categorizing and defining human desires and preferences. Considering the expertise and observations of different people provides a more objectively true and thorough insight into the minds of the audience.

The Player Types were derived from preexisting taxonomies and attempts to group the motivations and desires relating to games. The selected taxonomies are some of the few grouping players by psychographic attributes and all examine this theme from slightly different angles (Types, Pleasures, Motives), without repeating their point of view. 21 categories with their origins in three different taxonomies were examined. Their traits and attributes were analyzed to determine similarities and differences. They were then grouped by those traits to create new, sometimes more broadly defined, Player Types. The comparison of the different categories and resulting Psychographic Player Types can be seen in Table II.

Here, the different taxonomies are depicted in columns. Each cell contains one or more of their categories. The rows show which categories share similarities and were therefore combined, with the resulting Player Type of each comparison being presented in the right-most column.

TABLE II. PLAYER TYPES DERIVATION

Bartle's Taxonomy of Player Types [20]	**LeBlanc's Taxonomy of Game Pleasures [21]**	**The Aesthetic Motives of Play [19]**	**The Psychographic Player Types (result)**
	Narrative	Narrative	**The Narrator**
Achiever, Killer	Challenge	Problem-Solving	**The Challenger**
Socializer	Fellowship	Social	**The Socialite**
Explorer	Discovery	Curiosity	**The Explorer**
	Expression	Agency	**The Expressionist**
	Submission, Fantasy, Sensation		**The Dreamer**
		Thrill-Seeking, Horror	**The Daredevil**
Achiever		Victory	**The Winner**
Achiever, Explorer		Acquisition	**The Collector**

While sometimes different categories from different taxonomies were combined to create a Player Type, occasionally some categories of one taxonomy were fused into one Player Type with a broader definition.

The only category that is absent is the "Luck Motive" of the "Aesthetic Motives of Play" [19]. This is because, on one hand, that motive is describes as a desire for fairness and equal opportunities, which every person has to a degree. On the other hand, Players of a CDG should not rely on luck to achieve victory, as this does not underline the learning and improvement of a skill or competence.

From these Player Types, as well as the Framework components, a need for empirical research arises to ensure that these conceptually derived elements indeed exist as assumed through the literature examination. However, because the player preferences are crucial during the use of the UFoS Framework (represented through Player Types), a study has been designed to link Player Types to Player preferences.

This study was created in form of an online survey. First, the participants were asked to select up to two motivations factors to play video games from a list of nine motivations, corresponding to the Nine Psychographic Player Types. This information was utilized to group the participants into the Player Types. They were then asked several questions related to each Framework component, asking for preferences, likes and dislikes regarding video game stories.

Overall, the study includes 37 questions. The first 8 questions refer to demographic characteristics, like age and gender, but also to general video game subjects as the main reasons to play (Player Type) or whether the participant has ever played to learn. The following 5 questions relate to the Setting, followed by 9 questions about Characters, 8 about the Plot, 4 about Choices plus 2 about Presentation. Finally, there was one question referring to the desired balance between Characters, Plot and Setting.

118 people participated in the survey. Among them, all the Player Types were represented as seen in Figure 2. Each subject was assigned to up to two Player Types.

 ISBN: 978-1-61208-616-3

To validate the preferences and differences in preferences between each Player Type, the data records were grouped by Player Types. These grouped records were used to analyze for each question whether the average-answer of a certain Player Type is 'within the average' of all answers, 'above the average', 'below the average', 'strongly above the average' or 'strongly below the average' of all answers. By that, it was possible to determine whether the Player Types deviate greatly from another or whether they are very similar.

The analysis of the congruence in answers between Player Types determines that the highest congruence in answers in between two different Player Types is at 53.73%. The Player Types in question are the Narrator and the Dreamers. This means that for 53.73% of all answers, these two Player Types answered very similarly. In other words, if a game developer creates a game story to cater to Narrators, he would also be catering to Dreamers about 53.73% of the time. This means that about half of the time the Dreamers would not be as satisfied with the design choices as they could be. This, in return, means that no two Player Types are similar enough to combine them into one. It can be interpreted as a confirmation that considering several types is meaningful.

To ensure that the differences in the Player Types are statistically significant, the answers to every item grouped by the Player Types were replaced by numbers from 1 (strongly below the average) to 5 (strongly above the average). This creates a scale from 1 to 5 for every answer, representing how much each Player Type agrees with the average answer. An ANOVA calculated with these data shows with $\alpha = .05$ a p-value < .0002 with $F_{(8;252)} = 3.963$ and a critical F-Value = 1.975. By that the H_0 hypotheses "there are no differences in between the Player Types" with a level of significance of $\alpha = .05$ is to be rejected. Table III shows in how many cases the questions between two Player Types are "very similar" and, by that, in reverse the differences between the Player Types.

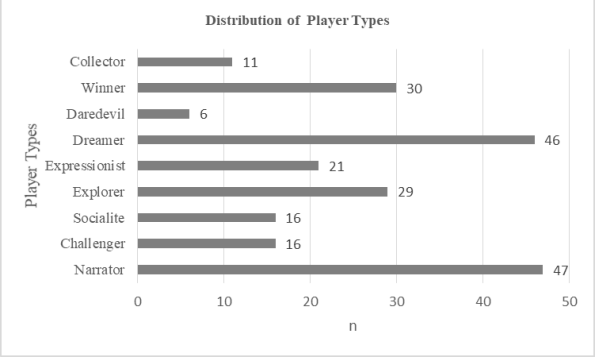

Figure 2. Player Type distribution

TABLE III. NUMBER OF 'VERY SIMILAR' ANSWERS IN BETWEEN PLAYER TYPES

	Na	Ch	So	E	Ex	Dr	Da	Wi	Co
Na									
Ch	**43%**								
So	31%	40%							
E	**53%**	40%	35%						
Ex	**43%**	**44%**	40%	**43%**					
Dr	**54%**	**50%**	**43%**	**52%**	**45%**				
Da	37%	30%	25%	32%	37%	29%			
Wi	40%	**44%**	34%	**43%**	38%	**45%**	28%		
Co	28%	26%	28%	32%	32%	32%	29%	33%	

Values >40% are bold printed

Therefore, many of the steps shown in Table I contain a note explaining what to do when dealing with which Player Type, allowing for the designer to optimize the story for the Player Types they uncovered in their audience. These notes are accessible as 'instructions' in [22]. These instructions are developed from the literature and only integrated into the Framework, if they were validated by the study. Therefore, the integrated concept between the UFoS Framework and the Psychographic Player Types provides a designer with the possibility to develop an audience optimized and entertaining CDG-Story. The entire concept has to be carried out iteratively. This ensures that the player preferences characterized by the Player Types are incorporated into all areas of the story and are noticed in all story developing phases. In this way (as shown in Section IV) the components Characters, Setting and Plot are influencing each other depending on the targeted Player Type.

However, a detailed review of the 37 questions, grouped according to the Player Types, in this paper is not meaningful in terms of the scope of this publication. It is planned to publish a detailed review in another publication with a different focus.

VII. CONCLUSION

A Framework that has the power to create an entire motivating CDG's story is explained in this paper. The Framework supports CDG story designers to ask themselves the necessary questions in the right moment and to take solidly based decisions in the right order. During that process, game story designers are encouraged to define their target audience. Therefore, due to the use of the UFoS Framework, it can be ensured that a story was created in which everything is included, and the right priorities were set. By that, the possibility to use CDGs for research topics is enhanced because the influence of the CDG's story on the research will be decreased.

The paper illustrated the Framework dependencies by utilizing a fictional example, establishing that it's possible to use the Framework in the field and underlining the connections in between the components. In addition to providing a simple use of the Framework, Nine Psychographic Player Types were described. Furthermore, it was explained how to use the Framework and where to get additional information and detailed procedures to do so.

 ISBN: 978-1-61208-616-3

Subsequently, the derivation of the UFoS Framework and the Nine Psychographic Player Types was described. For that reason, an empirical study was presented that validates the existence of the Player Types and the different characteristics. A story designer has to integrate these characteristics, depending on the Player Types and the current Framework phase or step.

However, it is required to further test and specify the Player Types and the UFoS Framework.

Currently, it is only statistically significantly proven that there are at least the nine identified Player Types; it could be possible that there are more yet unknown. Because the current nine Types were discovered during a literature analysis, an explorative empirical study will be useful to identify more types, if there are any. In addition, possible connections between the Player Types and demographic traits should be sought to more easily group a potential audience into the Player Types. Yet, the only method is close observation of the audience and asking them to evaluate their own motivations to play as has been done in the survey.

Although the Framework was carefully derived from the literature, it is only proven by concept, excluded from the step-instructions. Therefore, the next step will be a use of the Framework during a CDG development process to prove the concept as whole in a real development situation.

Furthermore, the UFoS Framework has been developed to get used by game story designers. So far it is not possible for laymen to develop a CDG story with the Framework. Enabling this could be the focus of future developments. It would require a deep understanding of every detail and aspect of a CDG story, but it would allow many scientists to perform CDG-based experiments even in small or low budget research groups.

In summary, the User-Focused Storybuilding Framework for Competence Developing Games provides a powerful tool to develop CDG stories.

REFERENCES

[1] D. Michael and S. Chen, “Serious Games That Educate, Train, and Inform,” Thomson Course Technology PTR, 2006.

[2] J. A. König and M. R. Wolf, “A New Definition of Competence Developing Games,” ACHI 2016, pp. 95-97, 2016.

[3] M. Zyda, “From visual simulation to virtual reality to games,” IEEE Computer Society (Computer), Volume:38, Issue: 9, 2005, P. 25-32.

[4] U. Ritterfeld, *Serious Games: Only Quality is Fun* (Original foreign title: *Serious Games: Nur Qualität macht Spaß)*, [Online]. Available at: http://www.checkpoint-elearning.de/article/5425.html [retrieved: January, 2018]

[5] J. A. König and M. R. Wolf, “The Pyramid Assessment Framework for ‘Competence Developing Games’,” HCI International, pp. 232-237, 2016.

[6] J. Schell, “The Art of Game Design: a Book of Lenses,” Burlington: Morgan Kaufmann, 2008.

[7] S. Rogers, “Level up the Guide to great Video Game Design,” Chichester: John Wiley & Sons, 2010.

[8] S. Field, “Screenplay: The Foundations of Screenwriting,” Delta, Revised ed., 2005.

[9] A. M. Freed, *Alexander Free*. [Online]. Available from: http://www.alexanderfreed.com/2014/01/13/craft-sessions-character-viewpoint-and-audience-sympathy/ [retrieved: January, 2018]

[10] Anon, *Dictionary*, [Online]. Available from: http://www.dictionary.com/browse/setting [retrieved: January, 2018]

[11] R. Nakatsu, M. Rauterberg, and P. Ciancarini, “Handbook of digital Games and Entertainment Technologies,” Signapore: SpringerReference, 2017.

[12] P. Hühn and R. Sommer, *The living handbook of narratology.* [Online]. http://www.lhn.uni-hamburg.de/article/narration-poetry-and-drama/ [retrieved: January, 2018]

[13] S. King, “On Writing,” Charles Scriber’s Sons, 2000.

[14] T. C. Caputo, “Visual Storytelling: The Art and Technique,” Watson-Guptill Publications, 2003.

[15] M. Aaron, “Design, User Experience, and Usability. User Experience Design for diverse Interaction Platforms and Environments,” Springer, 2014.

[16] A. Pitzer, *Harvey Smith on environmental Storytelling and embedding Narrative.* [Online] Available from: http://niemanstoryboard.org/stories/harvey-smith-onenvironmental-storytelling-and-embedding-narrative/ [retrieved: January, 2018]

[17] J. Wöbbeking, *4Players.* [Online] Available from: http://www.4players.de/4players.php/dispbericht/Allgemein/Test/30907/816 87/0/Gone_Home.html [retrieved: January, 2018]

[18] E. Miller, *Theories of Story and Storytelling*. [Online]. Available from: http://www.storytellingandvideoconferencing.com/ [retrieved: January, 2018]

[19] K. Karpouzis and G. N. Yannakakis, “Emotion in Games,” Switzerland: Springer, 2016.

[20] R. A. Bartle, *MUD.* [Online]. Available from: http://mud.co.uk/richard/hcds.htm#1 [retrieved: January, 2018]

[21] R. Hunicke, M. LeBlanc, and R. Zubeck, “MDA: A Formal Approach to Game Design and Game Research,” Workshop on Challenges in Game AI, AAAI, 2004, pp.1-4 doi: http://dx.doi.ord/10.1.1.79.4561.

[22] Lab for IT-Organization and Management, “Gamified Hacking Offence Simulation-based Training”, [Online]. Available from: http://www.itom.fh-aachen.de/pdf/UFoS-Framework.pdf Last access: 12.03.2018, 2018.

[23] Unity Technologies, “Unity”, [Online]. Available from: https://unity3d.com/ Last access: 12.03.2018, 2018.

[24] Epic Games, Inc. “Make Something Unreal”, [Online] Available from: https://www.unrealengine.com/en-US/what-is-unreal-engine-4 Last access: 12.03.2018, 2018.

 ISBN: 978-1-61208-616-3