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FEATURES OF USING DIVERSIFIERS OF HACKATHON-CONTESTS IN CANVAS-ORIENTED APPROACH TO GAME DESIGN

Annotation. *The article suggests a canvas-oriented approach to the design of computer games in the creative process of problem-oriented execution of development stages: studying consumers as players (the outline of a business model, the outline of an empathy card); studying the aesthetics of the game based on player needs (the outline of psychotypes and aesthetics of players , the outline of player's ability to manage information and actions); study of "Mechanics-Dynamics-Aesthetics" model properties (the outline of gamification model, the outline of game mechanics and dynamics); research and design of the game world (outline of the narrative, outline of the game world, outline of game levels, outline of ethical dilemmas). But canvas are not considered in the standard pre-defined development process but are considered in a special event-competition for rapid design in so-called Hackathon-competition, for example, in the Global Game Jam competition (GGJ) with a 48-hour game development cycle. A short period of time to design a game requires the same operational verification of the canvas of ethical dilemmas to reduce the risk of incorrect content of the game among beginner development teams. The analysis of the ethical dilemmas of the game was based on logic of the semiotic chain (sign - context - meaning - addressee), where each game object is a sign that in the specific context of the game narrative and player experience expresses meaning (meaning different connotations in terms of additional emotional, estimated, stylistic value of an object or phenomenon). The authors described GGJ-features in the form of diversifiers – optional restrictions that can be used by participants in their work so that their implementation in various variations can often create an innovative game. At the same time, it is noted that in research on design of computer games diversifiers are not given due attention as indicators of consumer requirements. Therefore, the purpose of the article was the inclusion of diversifiers in a canvas-oriented game design approach, which will take into account the effect of the short duration of the competition for the stability of the game design process. The prototypes of diversifiers in Hackathon-conditions of computer games design are presented. The structure of the diversifiers presented at two Hackathon contests (GGJ 2018 and GGJ 2019) was analyzed: five groups of diversifiers (sponsor, accessibility, art, sound, and design, narrative) with 64 diversifiers which were suggested to be grouped according to the "Mechanics-Dynamics-Aesthetics" model and copyrighted works on the design of the game. It is shown that the use of canvas structures the development process, reducing the time to generate design ideas in the process of inventing game mechanics and dynamics, when the canvas can become a roadmap for making creative decisions when designing a game. They can be a convenient basis for automating the process of designing a paper prototype of a game as a quest game process, provided that each outline represents a location with quest tasks, the variability of which depends on the capabilities of project team members. Diversifiers in the hackathon competition are important meta-components for the entire outline-oriented design of the game, optimizing the processes of creative and technical development not only from the point of view of competition, but also daily professional activity, creating a constant interaction of each stage of development with the requirements of the future game user.*

Keywords: canvas-oriented game design; gamification; creative product; automation of the creative process; diversifiers of game design

Introduction
Formulation of the problem

Game design is a complex multifarious and multistage creative process that includes the founding of a creative (innovative) idea and a business plan, the combination of such activities as testing, monitoring and project management and the implementation skills. Creativity depends on the aptitudes of individuals and organizations involved in creating a gaming product: ingenuity and the ability to find solutions; willingness to take risks and look at the problem from an unexpected angle; interest in experimentation; ability for reflection and continuous learning [1; 2; 3]. It should be noted that the concept of "canvas" as a method of visualizing and structuring thinking and knowledge is not new [4; 5; 6].In historiography there are actively developed methods for mapping data and knowledge [7], infographics [8].

Game Design Canvas (from French word "Canevas" – a sparse, reticulate, usually starched fabric for embroidery across the cells; the framework of something) is understood by us as a visual abstract structure that generalizes a case subject consisting of such elements as a problem, solution and consequences, and contains accumulated experience.

Canvases filled with specific content (ideas, facts, assumptions, feelings, actions, descriptions, etc.) make it possible to effectively solve the task and create a unique creative product. By this, Canvas differs from Template, since the latter does not imply variability and creativity. The template is focused on producing the identical products, whilst in contrast canvas implies the creation of various original projects. Canvas includes templatization as a framework and elements of almost all visualization methods (creative freedom) [9]. Canvasation tools are images and notes on stickers and cards attached to charts, grids, tables, matrices, affinity diagrams, clusters of ideas, patterns, maps, algorithms, ratings. Nevertheless, the method of constructing and reading the canvas is different from, as example, knowledge maps. The point of departure for mapping is generally the center (the main concept), whilst the design of the canvas is determined by the essence, structure and logic of the case task: it starts from the end – understanding the goal – to a tangible state. The logic of canvases reading depends on the mechanism embedded in them: bottom-up-right, if the axis of coordinates of time and significance is important; from chaos to or-dering, if based on clustering; clockwise - to describe and analyze the object as a unitary system.

The canvases of game design comprise the character-istics of knowledge cards, since they allow to present quite complex concepts in the most intelligible combination of elements and imageries of the game knowledge system (ideas, tasks, process, etc.), make it possible to cover the situation as a whole, as well as to keep in mind simultaneously a large amount of information in order to find connections between individual parts, find the miss-ing elements, memorize information and be able to repro-duce it even after a long period of time. However, in contrast to knowledge maps, canvases are not only a means of understanding complex processes, but also peculiar routers in the process of achieving goals. In other words, the knowledge maps and infographics mainly perform an explanatory function (comprehension, awareness, vision, memorization, logging), whereas the canvas stimulates the function of constructing the rules of the game world, levels etc.

Creating the canvas as an information model of a computer game, filling it up as a result of making a creative decision correlates with the essence of creative think-ing as a processes contributing to the generation of innovative problem solutions [10], as the kind of thinking, which best produces creative results [11].

Related work

The issues of optimizing game design processes by the instrumentality of visual tools have been examined since the theoretical development of MDA [12] and DPE [13] models as game analysis tools. At the same time, these models were the basis for the development of computer games. Meanwhile the features of the canvas language were studied [6]. Visual game design methods as brain-storming technique were presented in the book [5]. Inter-estingly enough that all forms of visualization of thinking in the process of designing business processes are called "game" by the authors. The latter consists of such important elements as [5]: Game space (conventional topos, agreement-based topos), Boundaries (game chronotop), Rules for interaction, Artifacts (maps, playing dibs, dices, stickers with notes, all tangible movable objects contain-ing information) and a Goal. The main stages of activities of the game designer in this case are: "imagine the world", "create the world", "open the world", "explore the world" and "close the world". Depending on the game designer's idea, actions can be single, cyclic, parallel and serial.

The development of design patterns as a single tool and integration language for game producing is one of the top themes in the industry-specific community [14; 15; 16; 17; 18]. Nowadays, such scientific Internet platforms as Academia.edu and Scholar.google comprise more than 348 thousand and 3,6 million publications on the problems of game design templatization respectively. At the same time, scientists are considering the question: what should be the basis of the game design pattern? Different starting points are proposed for the development of such canvases: classification of serious games [25], project activity [5], game design patterns [17], player profiling and motivation [20]. As a result, it is noted the necessity of creating a database of project concepts [21]. At the same time it is important that attempts were made to automate the process of game design, to develop an intelligent system that generates computer games by modeling and generating game mechanics [22].

Today, there is a tendency to interpret game design as an automated process, which is based on the universal integrated pattern "Design Pattern Canvas". At the same time, superfluous abstraction of the game design canvas complicates the process of such automation, as it forms only a superficial idea of the game project, limits the degrees of freedom of the game designer (the choice of game genre and aesthetics, the development of game history and rules, their balancing, level design), and narrows

variability of creative solutions. It is reasonable to develop a cycle of interrelated canvases, corresponding to the stages of game design, and to detail them in the shape of sets of case diagrams and guide notes, which will later allow to structurally formalizing the process of games producing.

Theoretical and practical issues of developing computer games in limited Hackaton conditions were considered by many scientists: a comparative analysis of hackathons [33; 34; 35], the experience of inclusive design [36], the evolution and significance of the Global Game Jam [37]. For our research, methodological works are those that affect the problems of game design limitations in the conditions of competition: external (access to the Internet, power supply) and internal (motivators) [38]. However, scientists and practitioners of game design did not consider such important aspects of competitive activity of game designers as diversifiers, which are indicators of consumer demand.

Purpose of the research

The purpose of article is to propose the diversifiers of game design for the hackathon to optimize their accounting in the development of games. This will allow taking into account the effect of short in time events on the stability of the game design process.

The goal caused an implementation of the following tasks of the research:

1) analysis of the classification of diversifiers adopted at the Hackathon GGJ and its comparison with the game-play model MDA (Mechanics – Dynamics – Aesthetics), by canvases of game development stages and game design components for identifying application points of diversifiers as control mechanisms in crea-tive and technical game creation processes;

2) development of methods for effective selection of diversifiers in the aspects of determining the optimal number and quality of diversifiers of the game being developed.

Research methods

The purpose of the research determined the usage of such research methods as:

– Selective analysis - for the study of documents and scientific literature on the research topic;

– Terminological analysis - to clarify the categorical concepts of the study;

– Decomposition method - to identify individual elements of game design as a system for creating canvases;

– Structuring method - to study the relationship between the elements of game design;

– Descriptive modeling method - to describe the canvas as a case of game design;

– Generalization method - to formulate the relevant conclusions of the study.

Presentation of the main research material

In our works [9] we proposed a series of canvas in game design, based on MDA & DPE models [12], as well as the principle of "experience" or creative case-problems of the development stages of computer games:

1) Studies of consumers as players:

– Canvas of Business Model [23];

– Canvas of Empathy Map [5].

2) Studies of the aesthetics of the game based on the needs of the player:

– Canvas of Player Psychotypes & Aethtetics

– Canvas of Player's needs in Control, Information and Action.

3) The MDA-components of "Game Mechanics" and "Game Dynamics" include:

– Gamification model canvas [20];

– Canvas of Game Mechanics & Dynamics;

4) Research and design of the game world:

– Canvas of Narrative;

– Canvas of Game World;

– Canvas of Game Level;

– Canvas of Ethical Dilemmas.

Figure 1 presents only modified or new proposed canvas.

Canvas of Player Psychotypes & (game) Aethtetics – the canvas of the correlation the players' psychotypes with the desired emotional reactions that should be caused by the dynamics of the game. For the design of the canvas, 8 components of the game aesthetics [12] were used, as well as the taxonomy of player types [24], elements of the theory of entertainment (fun) in learning [25]. On the canvas the personality types and components of the game aesthetics are detailed and grouped according to the proximity of their characteristics, but the canvas does not limit the interaction of its components, stimulating unexpected creative solutions. The canvas offers the game designer a choice of the target audience, aesthetics and entertainment components (fun), filling the corresponding canvas cells with his vision of these elements. The combination of choiced components gives rise to the general idea of the game. For example, the player "Creator-Explorer" in accordance with the aesthetics of "Challenge" and "Easy Fun" will form a game competition for the speed of searching and creating artifacts. The identified key characteristics of the consumer are the basis for building maps that allow exploring and creating the aesthetics of the game. In

the case of designing educational games, the choice of the prevailing aesthetics is not determined by the results of testing and the player's psycho-type examination, but with regard to goals and subject area of the discipline. If one of the goals of the training discipline is to form communication skills, then the game designer needs to choose the type of "Socializer", Aesthetics of "fellowship" and "social" fun. Canvas of Player's needs in Control, Information and Action determine the choice of a computer game genre based on studies of the classification of game genres [9]. The above mentioned canvases lay the foundations for the subsequent character creation and game history. Gamification model canvas [20] gives an overview of game.
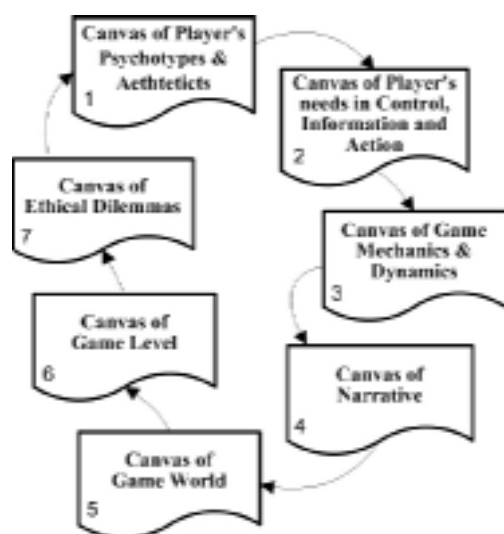

Fig. 1. Series of Canvas for Game Design

Canvas of Game Mechanics & Dynamics presents game mechanics and dynamics as a formula consisting of elements of mechanics (actions, chances, win conditions and bonuses) and control forces of dynamics (rules, time, statistics, balance). This Canvas, in our opinion, is one of the most difficult to visualize, since the very concept of "dynamics" in the game community is not clearly and broadly defined. In general terms, dynamics can be understood as an instrument of aesthetics, creating a feeling of the game, as the process of the game itself and the game "session", as the behavior of the game as a system; as the rules of the game, which are used in the movement (campaign, process, sequence of turns); as a set of game mechanics created to form a certain result; as triggers that determine the players behavior and the players own actions, as the strategic way of application of the rules and known combinations in the game. Proceeding from etymology of the Greek word δύναμις ("strength, power"), by

the term "game dynamics" we mean the state resulting from the interaction of the game mechanics. Therefore, the dynamics can not be considered in isolation from the game mechanic.

Canvas of Narrative allows creating and developing the plot of the game. The basis of this canvas was taken by the empathy map canvas, but the content of the canvas was thoroughly revised in accordance with the cultural and structural-semiotic studies of literary and folklore texts, the theory of cultural universals and the mechanisms, concepts of C. -G. Jung, V. Ya. Propp. Canvas of Game World helps to visualize and plan the physical world of the game. This Canvas gives game designers the opportunity to explore the game world. Canvas of Game Level gives game designers the opportunity to explore and design the levels of the game. Automatization of process of computer games development is seen by us through the formalization of the connection of the cycle of canvas of design game in the form of formulas.

It seems promising to use a series of canvases for gamification of the game design process provided that each canvas is a location with quest tasks, the variability of which depends on the potential and attitude of the leader and team. In such a case each cell of the canvas is an object for the game designer's mechanics, and the variants of the game design solutions can be the result of a carefully considered choice of characteristic combination within the canvas and the result of randomness mechanics by using dices and playing cards with content of the canvas.

Analysis of accepted classification of the Hakaton diversifiers GGJ [39] showed that the categories of diverter groups "Sponsored", "Accessibility", "Art", "Design", "Narrative" refer to weakly structured information array of characteristics and requirements that are difficult to imagine in an integrated system of MDA-model and game development stages. The experience of correlating the sample of diversifiers with the components of the model and the canvas re-vealed the ambiguity and subjectivity of this process. The results are summarized in the diversifier of the Hackathon in Table 1. Notation keys have been introduced into the table. For MDA model elements: Mechanics component: M1 – Manipulation rules; M2 – Goal Rules; M3 – Meta rules; component Dynamics – D; Aesthetics component – A. For the named groups of diversifiers – the first letters of the category, for example, "Sponsored" – S. To assess the impact of diversifiers on a canvas-oriented design process, diversifiers of hackathons GGJ 2018 and GGJ 2019 were analyzed [39]. The list of diversifiers is presented in Table 1.

Table 1. Links between diversifiers and components of the MDA model, Type of Canvas

Diversifier	Description of diversifier	Group of diversifiers	Type of Canvas	Element of MDA:
"Community Strength. Art of sharing"; "Power of Community"	Make a game where community impacts your game, players can enhance the game, change the outcome, or be a unifying force	S	Canvas of Player Psychotypes & Aethteticts	D
"Players with special needs and disabilities"; "Positive vibrations"	Diversifiers from sponsors as game addressees	S		A
"Let me show you how this is done"	Make a game that is accessible to or represents your own disability, or that of a member of your team, in the way you feel all games should address it	A	Canvas of Player's needs	M1
"Let me see"	Game has customisable colours, allowing players to change the aesthetics and contrast to their own preferences	A		A
"Puzzle Design Challenge"	Make your game around, or inspired by a real world toy you have played with in your lifetime	S	Canvas of Game Mechanics & Dynamics	M1
"Bolter is jammed!"	Make a game where the main action is obviously missing (platforming game with no jump, shooter without weapons, etc.)	D		
"Use the source, Luke"	Use one or more open source tools, game engines or libraries in your game	S		M3
"Keep it simple"	Make your game playable by people who can use no more than a D-pad plus 2 buttons, with hardware like an Xbox Adaptive Controller in mind	A		
"The guide I was looking for"	Your game has a supplementary guide, using a different medium than the game itself, that players must refer to to beat the game	D		
"There is always room for one more"	Make a game where new players can join at any time	S		D
"Cardboard Challenge"	Use pictures of cutout cardboard for art assets	ART	Canvas of Narrative	A
"Russell's Teapot"	The aim of the game is to prove something unprovable	N		M2
"Palindrome"	The game story must end the same way it began	N		M1
"Meanwhile"	The story of your game takes place on the backdrop of a seemingly-more significant story. While the real heroes fight evil, what happens elsewhere?	N		A
Diversifier	Description of diversifier	Group of diversifiers	Type of Canvas	Element of MDA:
"Babe, It Just Ain't Your Story"	Gameplay must take place from the point of view of a non player character	N		A
"Epistolary"	Game must be completely in the form of a series of documents such as letters, diary entries, newspaper clippings, etc.	N		A
"Lost in translation"	Make a game which plays differently depending on language selection.	N		A, M1,2
"Independence from the language"	Create a game that can be understood regardless of which language the player speaks	S		A
"Cartographer"	Incorporate geo-location data in your game	S	Canvas of Game World	M3
"On the web page"	Your gameplay is hidden in a seemingly normal web page	D		
"Mind over matter"	Add a voice over narration to the gameplay	ART		A
"Stranger Things"	Your game's ambience is inspired by an 80s pop song			
"Beatbox"	All sounds for your game must be created using your voice or body			
"4′33"	Your game must draw attention to the natural soundscape of the environment in which the game is being played			

Information Technology in Education

Table 1. Continuation

"Ephemeral"	Make a game that can only be played once by each player	D	Canvas of Game Level	M1
"Super Secret Cache"	Feature a hidden room within your game	D		A
"Increase with the song"		D		D
"Forgive and strengthen"; "Good game"		S	Canvas of Ethical Dilemmas	A, M2

It has been noticed that the diversifiers "Sponsored" are mainly focused on marketing the game being developed; therefore they can be comparable with the canals of psycho-types and the needs of the players.

The diversifiers of the group "Narrative" fully correspond to Canvas of Narrative, however, they can also be referred to Canvas of Game Mechanics & Dynamics, since narration can be non-verbal and at the same time can act as a guiding mechanism not only for the development of the game plot but according to the rules. Bright example is the diversifier "Lost in translation". Canvas of Game Level is a good platform for developing games with the diversifiers of "Design" group. For di-versifiers of the Accessibility and Design groups, it is difficult to determine a place in any canvas immediately, since they can concern all components of the MDA model of the game. The most uncertain is the group "Art", which corre-spond to the Aesthetics component but are implemented in different canvas: Canvas of Game World, Canvas of Game Mechanics & Dynamics.

It can be stated that the Hackathon diversifiers GGJ are formulated integratively and, thus, they complicate the optimization and automation of the process of developing computer games. In addition, the analysis of the game diversifiers showed a general orientation of the competition for the development of technical aspect of the

Information Technology in Education

Computer game development, since they clearly correspond to the technical-software information blocks of game-graphics document: graphics, musical scores and sound effects, single player game, multiplayer game, objects appendix, user interface appendix, networking appendix. At the same time, the humanitarian component of the games: the plot, the game world, and ethics are poorly represented. It leads to the creation of games that are spectacular from a programmer's point of view (engine, graphics, sound, interface, etc.), but with weak mechanics of rules, an undeveloped plot, and a violation of ethical norms. For example, in the location of Odessa HaKaton GGJ 2019 in the topic "How I im-

agine a house" a computer game was presented, the main topic of which was bloody battles between the members of one family.

It is interesting to note that game design diversifiers are actualized at any stage of the game development process (in each of game design canvas) and in any component of the MDA model. Therefore, diversifiers can be considered meta-settings in relation to all stages and processes of game design. Diversifiers make it possible to systematically and gradually adjust the process of game design according to the needs of a specific consumer.

The final and verifiable canvas in the process of canvas-oriented game design is the canvas of Ethical Dilemmas (Fig. 2).

A very short time for game design requires that this outline be taken into account, reducing the risk of creating socially incorrect game content for start-up development teams. Canvas of Ethical Dilemmas to regulate the game with regard to balance and ethics by detecting deficiencies in the gameplay components, controlling the achievement of the necessary aesthetics and solving ethical conflicts, adjusting feedback between channels so that, ultimately, create socially useful human oriented product. The algorithm for routing the components of the canvases also will be developed, allowing automating the process of filling out sections of the Game Design Document.

The theme of good and evil is one of the oldest basic topics in philosophy, aesthetics, religious studies and folklore. Evaluation of any categories of moral consciousness, and of all phenomena of Being, in one way or another, leads to arguments of God's justification (Christian medieval concepts of Aurelius Augustine [26], Thomas Aquinas [27]), defining the role of evil in the world of spirituality (Western Europe GV Leibniz [28], I. Kant [29]). The paradigm of binary oppositions in the understanding of good and evil is overcome in the work of geniuses of the twentieth century – J. P. Sartre and F. Nietzsche [30]. So, J. P. Sartre [31] declares recognition of a person's personal responsibility for everything that happens in the world, F. Nietzsche rejects the absolute of the forces of good and evil, denies the fact of universal morality.
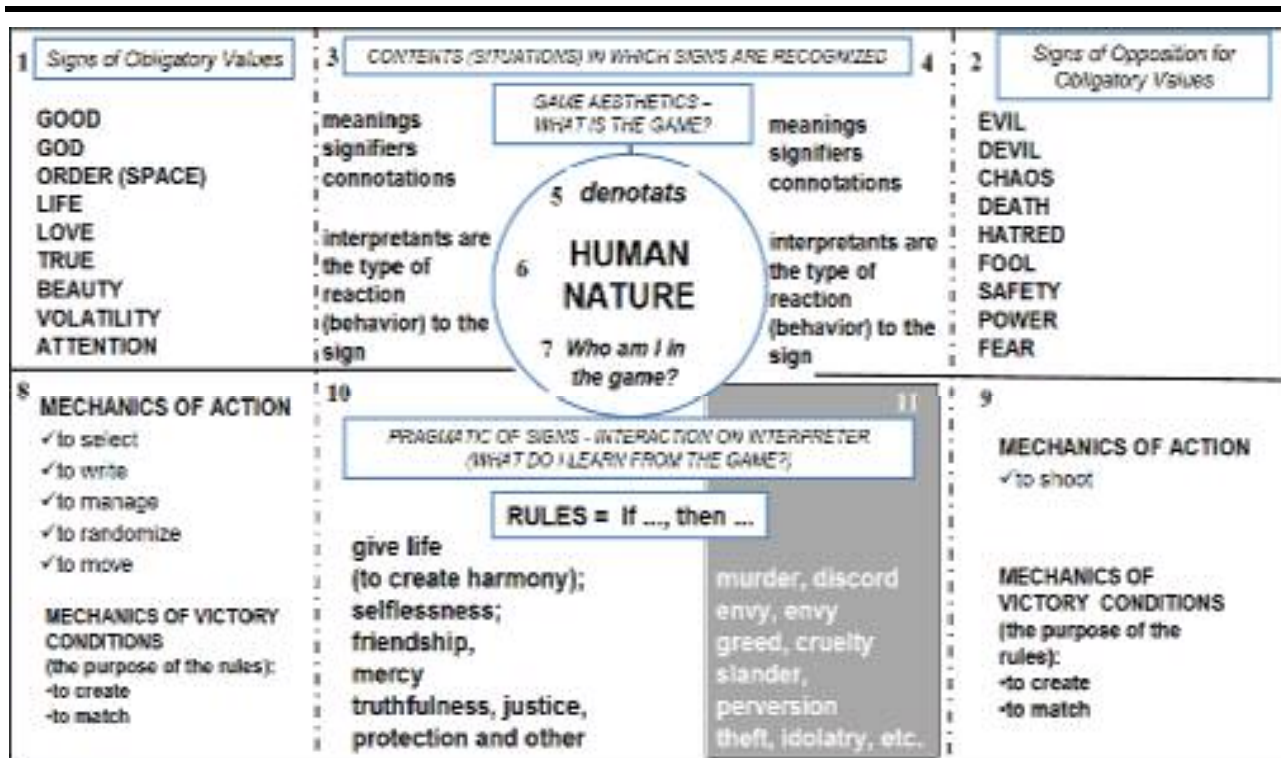
Fig. 2. Canvas of Ethical Dilemmas

Creating the Canvas of Ethical Dilemmas of game design was dictated by Sartre's responsibility to the descendants of the information society and the need to create socially useful products. Therefore, the structure and content of this canvas are inspired by the above concepts. The requirement of formalization of complex moral and ethical dilemmas led to the use of the foundations of semiotics, C. U. Morris, R. Jacobson, F. de Saussure, G. Frege. In this sense, the game acts as a system of signs, the properties of which are found in "relational relations" acquired by objects in the functional process of semiosis [32].

The analysis of the ethical dilemmas of the game will be based on the logic of the semiotic chain proposed by R. Jacobson: sign – context – meaning – addressee. Each game object is a sign that in the specific context of the game narrative and player experience expresses meaning (meaning different connotations in terms of additional emotional, evaluative, stylistic meanings of an object or phenomenon).

It is important to note that hackathon diversifiers should not be considered as a restriction of game design; rather, it is a set of various recommended tasks (descriptions, sub-topics), filters (operational restrictions) for game design, which are designed to narrow and refine and diversify the ideas of game

designers. In the conditions of a hard time limit for the creation of a game project, diversifiers of competition can serve as guidelines for the creative process of creating a game or even game missions for game designers, if you gamify the hackathon process.

Canvas of Ethical Dilemmas, in our opinion, is a methodical platform for balancing the quality of game diversifiers. So, diversifiers of the Accessibility and Sponsored groups focused on people with special needs should focus on the central circle of Canva (sector 5; 6; 7) and not assume ambiguity during plot development (forbidden sectors 4; 11). This is solved by creating a list of the decryptors of the game being developed and comparing them with the descriptors of Ethical Dilemma Canva sectors. In this case, the descriptors of sector 1; 2; 5; 6; 7 are compiled in the initial stages of creating game concepts; sectors 8; 9 – when designing game rules; sectors 10 and 11 – in assessing the effects and effects of the game. Hackathon is a project event that functions in terms of a combination of constraints: time, theme, sub-topics, resources, competition. Therefore, the time allotted for familiarization, understanding and effective implementation of a set of diversifiers in the game should be minimized. The Canvas of diversifiers in Hackathon makes it possible to instantly determine the role and place of the diversifiers in the game development process, to

avoid the randomness of their choice, to level out the conflicts of demands and to avoid the "pull" of their implementation in the game.

Hereditary structuring of diversifiers led to the fact that many of them were not taken into account, or were not named, although the game matched the request. Thus, the experience of participation in the Hakaton Odessa location made it possible to state the rather weak representation of such diversifiers of Narration group. At the same time, the diversifiers of the Audio, Art, and Sponsored groups were the most popular.

Thus, the number of diversifiers is significantly growing from year to year. This necessitates the development of methods for the effective selection of diversifiers in the aspects of determining their optimal number for the game being developed.

The recognition of Bradford law universality, justified by V. Yatsko [42], gives the grounds to assume that an increase in the volume of diversifiers leads to a decrease in the quality level of their use in games.

Therefore, we suggest considering a sample of diversifiers according to the algorithm of their distribution into three thematic zones containing an equal number of diversifiers of the same type. Such zones can be MDA components, including the three most popular diversifiers. For example:

• Zone "Aesthetics" includes a sample of diversifikatorov "Sponsored", "Art", "Narrative".

• Zone "Dynamics" includes a sample of the diversities-fixers of the "Sponsored", "Design", "Accessibility" groups.

• Zone "Mechanics": "Sponsored", "Accessibility", "Narrative".

Table 2. Diversification zones for MDA-model

Charaton's diversifiers / MDA components	S	Acc	Art	D	N
Aesthetics	+		+		+
Dynamics	+	+		+	
Mechanics	+	+			+

Bradford's law can be formulated in different ways, for example, in the following form: 3 -7 diversifiers are selected randomly or intentionally, one of them should be from the Sponsored group.

The algorithm diversifiers selection consists of.
At the entrance:
1) mechanical limitations;

2) the limitations of the genre;
3) subject teaching area.
At the exit:
4) the rules of the game.

At Hackathon 2019 our team presented a board game with augmented reality "Way back home" [40]. The basis was the mechanics of the game "Circus", but the aesthetics, rules and dynamics were radically revised in accordance with the theme of the hackathon. We have implemented, but did not name the diversifier "Test design puzzles" – (With the support of Red Bull Mind Gamers and Tetris®) – "create your game based on the real toy with which you played in your life".

Canvas of psychotypes of players & Aesthetics:
– Player type - "Seeker";
– Aesthetics component - "Discovery";
– Fan - "Easy".

Canvas of Player's needs in Control, Information and Action:
– NI2 - solving riddles;
– NI3 - communicating with other creatures;
– NI5 - traveling (exploring worlds) in space and
time;
– genre - quest, quiz, adventure.

Canvas of Game Mechanics & Dynamics:
– action mechanics - move, manage;
– vechanics of victory conditions - race to the victo- ry, avoid, the winner is the one who first reached the finish line;
– the Mechanics of luck - additional move;
– vechanics of chance - dice, random.

The sequence and number of moves determines the dice.

Canvas of Narrative:
– the plot type - nonlinear, concentric, with clear causal linkages between episodes.

History – Heroes of the game - pets: cat Lucy, dog Max and mouse Charlie. Their task is to get home.

The plot line – the journey of heroes home. On the way, they meet on their way various surprises and obstacles that are realized in augmented reality: cheese –2 steps forward for the mouse; bone – 2 steps forward for the dog; milk - 2 steps forward for the cat. Broom – move back for all; trap – skip a move for everyone. Ladder – for all, move forward from 3 to 10; ice slide – a transition for everyone down from 15 to 8, a rope – a transition for everyone down from 6 to 2. A broom, cheese, cage, bone, milk are virtual, appear in augmented reality.

The game was originally determined to use the diversifier "Art. Cardboard Challenge: Use images

cut out of cardboard in the game" and was realized with cardboard objects "ladder" and "hill". However, during the development process, it was decided to add the diversifier "Good game: Make a game that will show how a choice in the direction of good can change the world". This requirement was realized by the opportunity for the heroes to choose: go on their own way or negatively influence the opponent. Thus, the sector introduced 4,13,9 – a virtual quiz. If the hero answers the question correctly – he makes 3 moves ahead or points to any of his opponents so that he missed the move.

The diversifier "Porcupine dilemma: Make a cooperative game in which characters need to interact, but they cannot be close to each other" was represented by the preambles of the interaction of characters if they fall into one sector:

– dog and cat, cat takes 1 step back;
– cat and mouse - the mouse takes 1 step back;
– dog and mouse - stand nearby.

Canvas of the Game Level: the player progress is shown by his place on the playing field. However, the study of diversifying levels of the game gives us the opportunity to introduce more secrets into the game ("Created by Warren Robinett"), "Passion for travel – your game tries to awaken interest in traveling and visiting new places, with an emphasis on your hometown". Each sector of the game becomes a tourist attraction or street of his native city and turns into a guide quest.

Conclusions and perspectives of further research

Analysis of the Hackathon diversifiers GGJ made it possible to conclude that the diversifiers are formulated integratively and, thus, complicate the optimization and automation of computer games development. The classification analysis of game diversifiers showed the general orientation of the competition for the development of the technical aspect of computer game development, since the diversifier groups correspond to the technical and software information blocks of the game design document. Nevertheless, the total set of diversifiers represents a weakly structured informational array of characteristics and requirements that are difficult to imagine in a complex system of MDA models and stages of game development.

At the same time, the suggested series of game design canvas is a kind of springboard to rising the intuition and creativity of game developers. It could be used in individual and group work as a tool for cooperation. Canvas documents the progress and results of the creative process, stimulate it, while

being both clues and guides in game design. In this case, the canvas corresponds to the principles of visibility and intuitive clarity, conciseness, renewability, transparency and variability. They structure the game development process; reduce the time taken to generate game designer ideas and to contrive game mechanic and dynamics. Canvases are an additional road map toward making creative decisions in game design. They can be a convenient basis for automating the process of latter, a paper prototype of the game and the game itself.

The canvas of game design is focused on the development of "deep games", with a developed game world, a plot and levels. Thus, the Canvas of Ethical Dilemmas, in our opinion, is a methodical platform for balancing the quality of game diversifiers by compiling a list of descriptors at different stages of game design.

The MDA-based approach to the classification of character game diversifiers makes it possible to apply the Bradford information scatter law and to make an optimal quantitative sample of diversifiers to create a successful game project.

In the future, it is planned to hold contests for-students and schoolchildren in the format of hackathons, where will be presented game scenarios of interaction between a person and a computer using education robotics [41].

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ОСОБЛИВОСТІ ВИКОРИСТАННЯ ДІВЕРСІФІКАТОРОВ HACKATHON-ЗМАГАННЯХ ПРИ КАНВА-ОРІЄНТОВАНОМУ ПІДХІДІ ПРОЕКТУВАННЯ КОМП'ЮТЕРНИХ ІГОР

Анотація. У статті розглядається канва-орієнтований підхід до проектування комп'ютерних ігор в творчому процесі проблемно-орієнтованого виконання етапів розробки: вивчення споживачів як гравців (канва бізнес-моделі, канва карти емпатії); вивчення естетики гри, заснованої на потребах гравця (канва психотипів гравця і естетики, канва потрібностей гравця в управлінні, інформації і діях); вивчення властивостей моделі «Механіка-Динаміка-Естетика» (канва моделі Гейміфікація, канва ігрової механіки, канва ігрової динаміки); дослідження і проектування ігрового світу (канва наративу, канва ігрового світу, канва ігрових рівнів, канва етичних дилем). Але канви не розглядаються в стандартному заздалегідь визначеному процесі розробки, а розглядаються в спеціальному заході-конкурсі зі швидкого проектування – в так званому Hackathon-конкурсі, наприклад, в конкурсі Global Game Jam (GGJ) з 48-годинним циклом розробки гри. Дуже короткий час на проектування гри вимагає такої ж оперативної перевірки канви етичних дилем для скорочення ризиків некоректного змісту гра у початківців команд розробників. Аналіз етичних дилем гри був заснований на логіці семіотичного ланцюжка (знак - контекст - сенс - адресат), де кожен ігровий об'єкт – це знак, який в специфічному контексті ігрового наративу і досвіду гравця висловлює значення (значення різних конотацій в термінах додаткового емоційного, оцінного, стилістичного значення об'єкта або феномена). Автори описали GGJ-особливості у вигляді діверсіфікаторів - опціональних обмежень, які можуть бути використані учасниками в їх роботі так, що їх реалізація в різних варіаціях може часто створити інноваційну гру. В той же час, відзначено, що в дослідженнях з проектування комп'ютерних ігор діверсіфікаторам не приділено належної уваги як індикаторам споживчих вимог. Тому метою статті стало включення діверсіфікаторів в канва-орієнтований підхід проектування гри, який дозволить врахувати ефект від короткостроковості терміну конкурсу на стабільність процесу проектування гри. Представлено прототипи діверсіфікаторів в Hackathon-умовах проектування комп'ютерних ігор. Проаналізовано структуру діверсіфікаторів, представлених на двох Hackathon-конкурсах (GGJ 2018 and GGJ 2019): п'ять груп діверсіфікаторів (спонсорська, доступність, мистецтво, звук, проектування, наратив) з 64-ма діверсифікаторами, які запропоновано згрупувати відповідно до моделі «Механіка-Динаміка-Естетика» і авторськими канвами проектування гри. Показано, що використання канв структурує процес розробки, скорочуючи час на генерацію ідей проектування в процесі придумування ігрової механіки і динаміки, коли канви можуть стати шляховою картою для прийняття творчих рішень при проектуванні гри. Вони можуть бути зручним базисом для автоматизації процесу проектування паперового прототипу гри як квестового ігрового процесу за умови, що кожна канва являє собою локацію з квестових завдань, мінливість яких залежить від можливостей учасників проектної команди. Діверсифікатори в Hackathon-конкурсі є важливими мета-компонентами для всього канва-орієнтованого проектування гри, оптимізуючи процеси творчого і технічного розвитку не тільки з точки зору конкуренції, але і повсякденної професійної діяльності, створюючи постійну взаємодію кожного етапу розробки до вимог майбутнього користувача гри.

Ключові слова: проектування комп'ютерної гри; канви проектування, гейміфікація, діверсіфікатори гри, автоматизація проектування

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Information Technology in Education

ОСОБЕННОСТИ ИСПОЛЬЗОВАНИЯ ДИВЕРСИФИКАТОРОВ HACKATHON-СОРЕВНОВАНИЙ ПРИ КАНВА-ОРИЕНТИРОВАННОМ ПОДХОДЕ ПРОЕКТИРОВАНИЯ КОМПЬЮТЕРНЫХ ИГР

Аннотация. *В статье рассматривается канва-ориентированный поход к проектированию компьютерных игр в творческом процессе проблемно-ориентированного выполнения этапов разработки: изучение потребителей как игроков (канва бизнес-модели, канва карты эмпатии); изучение эстетики игры, основанной на потребностях игрока (канва психо-типов игрока и эстетики, канва потрібностей игрока в управлении, информации и действиях); изучение свойств модели «Механика-Динамика-Эстетика» (канва модели геймификации, канва игровой механики и динамики); исследование и проектирование игрового мира (канва нарратива, канва игрового мира, канва игровых уровней, канва этических дилемм). Но канвы не рассматриваются в стандартном заранее определенном процессе разработке, а рассматриваются в специальном мероприятии-конкурсе по быстрому проектированию – в так называемом Hackathon-конкурсе, например, в конкурсе Global Game Jam (GGJ) с 48-часовым циклом разработки игры. Очень короткое время на проектирование игры требует такой же оперативной проверки канвы этических дилемм для сокращения рисков некорректного содержания игра у начинающих команд разработчиков. Анализ этических дилемм игры был основан на логике семиотической цепочки (знак – контекст – смысл – адресат), где каждый игровой объект – это знак, который в специфическом контексте игрового нарратива и опыта игрока выражает значение (значение различных коннотаций в терминах дополнительного эмоционального, оценочного, стилистического значения объекта или феномена). Авторы описали GGJ-особенности в виде диверсификаторов – опциональных ограничений, которые могут быть использованы участниками в их работе так, что их реализация в различных вариациях может часто создать инновационную игру. В тоже время, отмечено, что в исследованиях по проектированию компьютерных игр диверсификаторам не уделено должного внимания как индикаторам потребительских требований. Поэтому целью статьи стало включение диверсификаторов в канва-ориентированных подход проектирования игры, который позволит учесть эффект о кратковременности конкурса на стабильность процесса проектирования игры. Представлены прототипы диверсификаторов в Hackathon-условиях проектирования компьютерных игр. Проанализирована структура диверсификаторов, представленных на двух Hackathon-конкурсах (GGJ 2018 and GGJ 2019): пять групп диверсификаторов (спонсорская, доступность, искусство, звук, проектирование, нарратив) с 64 диверсификаторами, которые предложено сгруппировать в соответствии с моделью «Механика-Динамика-Эстетика» и авторскими канвами проектирования игры. Показано, что использование канв структурирует процесс разработки, сокращая время на генерацию идей проектирования в процессе придумывания игровой механики и динамики, когда канвы могут стать путевой картой для принятия творческих решений при проектировании игры. Они могут быть удобным базисом для автоматизации процесса проектирования бумажного прототипа игры как квестового игрового процесса при условии, что каждая канва представляет собой локацию с квестовыми заданиями, изменчивость которых зависит от возможностей участников проектной команды. Диверсификаторы в Hackathon-конкурсе являются важными мета-компонентами для всего канва-ориентированного проектирования игры, оптимизируя процессы творческого и технического развития не только с точки зрения конкуренции, но и повседневной профессиональной деятельности, создавая постоянное взаимодействие каждого этапа разработки с требованиями будущего пользователя игры.*

Ключевые слова: *проектирование компьютерной игры; канвы проектирования, геймификация, диверсификаторы игры, автоматизація проектирования*