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EMPOWERING GAME DESIGNERS WITH GENERATIVE AI

JaeJun Lee[1], So-Youn Eom[2] and JunHee Lee[1]
[1]*Department of Game Design, Sungkyunkwan University, Seoul, Korea*
[2]*SKKU Game Center, Sungkyunkwan University, Seoul, Korea*

ABSTRACT

This paper explores how AI-based game design affects the game development process and the role structure of game development teams, with a particular focus on the changes it brings during the early game project proposal phase. We present a comparison of game design proposal cases conducted by a game designer over a span of four years, showcasing how the utilization of artificial intelligence is re-empowering game designers. We envision a empowered game designer capable of market sensing, artwork creation, playable prototype development, subsequent game analysis, and operations all by oneself or with a very small team, a "super game designer". This paper illustrates how AI is ushering in a new era for game designers, and discusses the potential to stimulate innovation within the game industry by fostering creativity and imagination of game designers.

KEYWORDS

AI, Game Design, Generative AI, Midjourney, Novel AI

1. INTRODUCTION

The core role of a computer game designer is to create engaging game play mechanisms. During the 70s and 80s, due to performance limitations of computers, innovative game play was the key competitive edge for game titles. In the early gaming market environment where games like Space War and Pong were released, individual developers or solo game designers held the highest authority (Newman, 2004). However, with the advent of high-performance computers and the need to implement sophisticated graphics and technology, modern game studios evolved into complex organizations requiring tight communication. In many instances, the responsibility for communication is often shouldered by game producers or game designers, highlighting its crucial role. While the role of a project manager involves sharing responsibilities, game designers bear a significant burden when it comes to communication related to game creativity. Due to such shifts in creative

environment, often the prioritized skills of game designers are communication skills instead of inventing an original core game mechanics. Ironically, the increasing power of the computers has also spurred the rapid advancement of artificial intelligence technology, which enables game designers to do what they are supposed to be doing, designing games and not talking to people.

Content designers need to persuade their team members, management and investors by presenting and formalizing their ideas in a visualized, tangible form. Initially, designers may explain their ideas using words, writings or drawings. However, accurately conveying ideas to the counterparts can be one of the most challenging aspects of the design process particularly in multidisciplinary fields like game design, where planning requires diverse and complex elements. Although designers can communicate their ideas more effectively by possessing various communication skills, such as drawing and perhaps making working prototypes, such skills should not be the essential requirements for game designers.

In this study, we argue that generative AI based services can enhance content designers' capabilities immensely. By comparing two in-production commercial game design document examples, one that was created in traditional way and one that was created with the help of generative AI services, we seek to explore how the new technology can empower the game designers to an extent that was not quite imaginable just a decade ago.

After the pen-and-paper prototype stage with the core mechanics of the game may be firmly established in the game designer's mind, depending on the project type or the needs of the stakeholders, detailed artwork or a working protocol may be required for approval. The process often represents laborious work involving a team of skilled people and a demanding schedule in addition to significant expenses. If a single designer or a micro team can match the same output, it can be viewed as a significant innovation in a game design process. AI-based tools offer the potential to create such a "super game designer." We will discuss how generative AI is revolutionizing the project proposal stage by comparing the case of project Walking Dead and project NOX, both developed by the same designer, focusing on the in-production game idea and pitching the proposal.

2. AI AND GAMES

Traditionally, AI in games has been understood to be used to control NPCs or enemy characters, or in sports games to control teammates. More specifically, it mimics intelligence by acting as a finite state machine with seemingly autonomous behavior within a very limited domain, or by sensing the current state of the game and making limited knowledge acquisition (Funge, 1999). In addition, generative technologies have been continuously studied in games, and various contents such as maps and levels can be automatically generated through procedural content generation for games (PCG-G) (Hendrikx et al., 2013) (Zhao, 2020), with varying degrees of success in different fields (Lara-Cabrera et al., 2012), (Cardamone et al., 2011), and (Hartsook et al., 2011), from the graphical elements of games to game scenarios including space, environmental systems such as paths and tracks, and puzzles. Entering the era of Deep Learning, we can find various attempts to incorporate AI into almost every facet of gaming. We have already seen AlphaGo beat the world's best players in highly complex strategy games as a player, and efforts are underway to create video game players (Oh et al., 2021). Within the screen, NPCs are interacting with players at a much higher level (Karpouzis

& Tsatiris, 2022), helping game production with level design (Mehta et al., 2022), or using them as a platform for creative ideas (Guzdial et al., 2019). Riedl & Zook have shown the potential for AI to support the game design process (2013). In addition, generative AI services such as Midjourney are already being actively experimented in the field of architecture as a tool to support conceptual design (Jaruga-Rozdolska, 2022), (Ploennigs & Berger, 2022). Game designers, who need to communicate their ideas to people of different disciplines, can also use the prompts of these generative AI services as a way to expand their talents.

The process of game design may vary slightly depending on the region, industry and game genre, but a typical commercial game production process in the case used in this study is market sensing, project proposal (documentation – prototyping - segmentation), production and service (including marketing, Quality Assurance 'QA', and Game Management 'GM'). The project proposal stage is led by the game producer and game designer. The project proposal phase can be divided into game design mechanics development, proposal documentation, and prototype software development to demonstrate the game's core fun or pitching presentation. A typical project proposal includes game design, artwork, scenario, production method, production technology and engine, BM, marketing plan, operations plan and production plan, all of which are developed centered around the core mechanics of the game. Therefore, the final documentation is done by the game producer or game designer, but at this stage, a team with various artists, programmers, and marketers is formed and has been involved.

During the documentation process, the game's main mechanics, worldview, and scenarios are proposed by the game producer and game designer, so many of the game's arts are naturally proposed by them. When drawing concept art that describes the vision of the game and creating art resources for prototypes to be used in-game, game designers will suggest various keywords. They may use word clouds or perception maps to convey the image they have in mind. They also use search engines or curation services such as Pinterest to present the images they have in mind. This is where the collaboration between game designer and artist comes in. The following examples illustrate how and how much the process of creating these proposals differs between traditional way and with generative AI.

3. CASE 1: WALKING DEAD: IDENTITIES

Project Walking Dead approached the game proposal in a generic way. The production company ('the company', henceforth) had a license agreement with American publisher Skybound to gamify the Walking Dead IP, and wanted to develop an art concept that would be suitable for a video game, but still capture the ambience of the original Walking Dead IP. The art style of a video game is a different endeavor than that of a comic book, and because of the different levels and dimensions of details required for the medium means that the style of the original comic cannot be used directly. The company outsourced the artwork in July 2019, communicating the game genre and key game design elements, as well as information about the target market and various reference texts and images to illustrate the desired style. The work lasted about two months, with weekly discussions. The initial artwork was for one character, three zombies, and one background. Unfortunately, the style did not quite align with the game designer's original intentions and deemed unsatisfactory.

The designer spent three months planning and explaining the specific references, keywords, and uses of the artwork and requested the artwork to be redone based on the artwork that was in line with the original intention. The art concept development started again at the end of December 19 and lasted for another month. In the second round of work, the design team was able to secure a number of concept designs that met the intent of the game design as requested. While the outsourced art company created the concept art, the internal development team implemented the core game mechanics created by the client programmers and game designers in collaboration. This was done by first prototyping with dummy images, and then replacing the dummy with real image once the artwork was complete. This process took a total of 7 months to create the game design mechanics, create the story and artwork to match the game design, and make the business pitch to Skybound in the U.S. and the company's investor after first coming up with the idea of developing a game based on The Walking Dead. Employed were 8 man-months per month, and specifically, 1 game producer, 1 game designer, 1 character artist, 1 background artist, 3 UI artists, 0,5 animators, and 0,5 client programmers. The total cost of labor and outsourcing was approximately KRW 157,500,000 (roughly equivalent to US$ 135,000 at the time of development).

The project Walking Dead demonstrated the importance of clear communication between game designers and art teams, as well as the need to plan and explain specific references and keywords to ensure that the artwork matches the original intention. It also highlights the significant investment of time, effort, and cost required to develop and pitch a successful video game.

The difficulty of sharing vision between game designers and artists and the delay in the iteration cycle is not an issue that only arises in the process of outsourcing. After the completion of the project pitching, the Walking Dead development team recruited in-house artists who had a similar style to the art used in the pitching in order to internalize the development power. The Walking Dead game required illustrations for over 100 different characters, and as many illustrations as the number of characters were demanded. In addition, the levels of artwork for the 100 or so characters should be appropriately distributed according to the designer's intention, from low to high levels, and the characteristics of the skills or attributes of each character should be reflected in the artwork. Therefore, each character illustration is a planned product drawn by an artist within the guided vision provided by the game designer. In this process, the artist intentionally creates low-quality artwork and clearly understands the intention of the game designer in order to reveal the functional characteristics of the character.

To create new characters, the game designer provides a 'Character Design Guide'. This document contains the external characteristics of the character, setting and story, function in the game, and art planning focused on costume and pose that the game wants to express. The game designer attaches reference images found through text and search engines to explain the characteristics of the character to be produced (Figure 1). Such guide is usually about 7 pages of PowerPoint document per each character and there were 100 characters so creating document just to communicate is a daunting task for the designer.

Figure 1. Example of images given for costume design and pose guide

The Costume design guide is provided with the following information:

- Consider the image provided, outfits look warm perhaps picked up from the luxury shop inside the building;
- Compared to the illustration, the image is relatively clean because it's from the past;
- Clothes have no blood on them but do not seem to have been washed in more than a few weeks;
- Shorter hair and beard;
- Various tools for making traps.

The pose guide is provided with the following information:

- Interior suggesting inside the High Rise Hell (skyscraper);
- The top of the Ferris wheel that can be seen out the big window tells that the building is a skyscraper in Atlanta. The sun is setting so the reddish light seeps into the room;
- Crudely made turrets and uninstalled traps are scattered around the room;
- Here and there, refrigerator food packages and opened cans of food are rolling around, There's an old sleeping bag in the corner with the shape of a human impression;
- Beaming looking up the camera and seems satisfied with the birth of a masterpiece (the turret);
- The facial expression would convey the state of confusion best when looking directly like the image provided. White breath to show that it is cold.

Upon receiving the game designer's instructions, the artist listens to the plan and proceeds with the sketch. After the sketch stage, a colored version that can convey the original's feel is created, and at this stage, the direction is checked with the game designer. When the consultation is completed at this stage, the final coloring is done, and the character illustration is completed.

On average, it takes three days for the game designer to come up with the character's ideas and write a 'character design guide'. After that, it takes one day to explain and sketch to the artist, and one day to color the base and reflect feedback from the game designer. After that, it takes two days to finish coloring. As a result, it takes at least 7 days to produce a new character illustration. In the "character design guide" stage, modification of the plan is required, or additional time is required depending on the feedback of the work after the sketch (Figure 2).

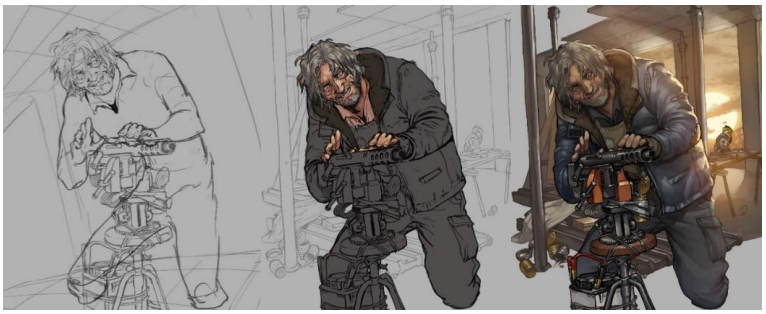

Figure 2. Approved sketch to coloring and completed image

While planning the Walking Dead: Identities project, one of the crucial considerations for the game designer was obtaining permission from the IP holder and publisher, Skybound. The game designer believed that while Skybound had a team involved in game business, they might have limited experience in game development compared to more seasoned game publishers or game development studios. Hence, the game designer had to convey the initial game experience as clearly and easily as possible. So a section titled "User Experience on Early Stage" was included in the Walking Dead: Identities proposal. This section illustrated the early gameplay scenes that users would experience after launching the game, similar to a movie storyboard, as in Figure 3 to depict the flow of the game. Through this approach, it became possible to precisely describe what content players would experience in the first approximately 20 minutes of gameplay. The project had a total of 107 scenes, consisting of 40 storyboard-style sketch scenes and 67 simulated gameplay scenes. The designer hired a professional artist, with the production process being divided into separate sketching and coloring stages. The artist, working on an 8-hour basis, produced 3 to 4 sketches per day. Additionally, the artist completed coloring 3 to 4 scenes per day. The speed of this work varied depending on the complexity of the scenes and the repetition of elements. The entire process took approximately one month to complete. Considering the efficiency of the coloring process, it was estimated that 2 hours per scene was deem highly efficient. Since the storyboard for the game proposal did not require high details, coloring primarily focused on establishing the mood and atmosphere, aiming to reduce both cost and time.

Figure 3. Example images from storyboard of Walking Dead: Identities

4. CASE 2: PROJECT NOX

Once the game mechanics were agreed upon between investors and designers, project NOX began by creating the world and artwork that would appeal to the target audience. During this process, generative AI was actively used to generate character and background artwork and write new scenarios. The designer would organize keywords related to the concepts he had in mind and then prompt Midjourney to generate images, a process that was virtually identical to outsourcing concept art on previous projects, but with immediate results and the opportunity to spark additional ideas and make numerous revisions and experiments with the deliverables. In addition to the time and cost savings, there was a realization that there basically was no need to have to make any effort to communicate with the outsourced artists and avoided the inefficient process of receiving artwork, discussing revisions, receiving the revised artwork and communicating the revisions back, or having to find an artist again if the desired output level was not met. Achieved results were impressive in creating illustrations of specific characters, story scenes, loading screens, title screens, etc. In the process of creating the UI, it was also very helpful in generating various icons and original artwork required for the UI. generative AI proved to be a great co-worker by stimulating the imagination of human designers and generating and showing them what they envisioned, with remarkable speed and efficiency. Only by this time the designer assembled a team of 3 (‘the team’, henceforth) with an assistant designer and an artist to make detailed adjustments to the generated outputs.

The design goal was a game that blended Simcity-like city-building with RPG elements and needed to come up with compelling concept artwork. The market sensing phase yielded the following keywords 'Voxel', 'Warcraft3 style deform', and 'supercell color'. Using these three keywords as the focus of the Midjourney prompt commands, generated a representative building image, a windmill.

The team generated an image of a windmill by repeatedly requesting regeneration using the same prompt command until the image matched the windmill's imagined form. Since the first prompt produced a result quite close to the desired image, regeneration was performed without changing the prompt. A total of 77 windmill images were generated, and the process took approximately 6 hours. 76 unselected windmills were rejected due to awkward or unintended voxel cube size or poor shape. During this process, the same prompt that created the final selected artwork was continually used, and Midjourney created various images with the same prompt command (Figure 4).

Figure 4. Selected windmill image (large image) and various rejected windmill images (small images)

The team also generated an image of pub. The game designer desired a building that could be easily recognized as a pub with an attractive expression of draft beer foam. The artwork's styles, like the windmill, consisted of a voxel, Warcraft3 style deformation, and Supercell colors. A total of 20 images were generated to obtain the desired result, and it took the designer approximately 2 hours to complete the work. The designer created this work without the assistance of an artist. Unlike when creating a windmill, the desired result was not initially obtained. The designer modified the prompt command slightly and created an image using two prompts to achieve the desired result. Table1 displays the pub images derived from each respective prompt. What is interesting here is that changing the order of the prompt keywords would impact the application of the corresponding command. Therefore, the designer rearranged the keywords, moving the "beer mug" keyword forward to alter its priority.

Table 1. Generated pub images with two different prompts

Result	Images	Prompt
Selected		voxel 3d, voxel pixel art of supercell color, A flat and small pub building made of logs, with a red roof, with a large wooden beer mug symbolically attached to the building, super deformed shape, witty shape, large top and small bottom, isometric voxel::3, bright atmosphere, vivid colors, made with three-dimensional pixels, super deformed, pixel art intricate, pixel art, hd, 3d, unreal engine, realistic photograph, hyper real hyper detailed. diorama, mounted on a square pedestal with multicolored tiles. bright background, full frame shot --q 5 --ar 2:3 --s 800
Rejected		Images rejected with same prompt with above

Rejected		voxel 3d, voxel pixel art of supercell color, With a wooden beer mug full of foam, no straw, A flat and small pub building made of logs, with a red roof, with a large wooden beer mug symbolically attached to the building, super deformed shape, witty shape, large top and small bottom, isometric voxel::3, bright atmosphere, vivid colors, made with three-dimensional pixels, super deformed, pixel art intricate, pixel art, hd, 3d, unreal engine, realistic photograph, hyper real hyper detailed. diorama, mounted on a square pedestal with multicolored tiles. bright background, full frame shot --q 5 --ar 2:3 --s 800

The designer also created characters in the same way as the building was created. According to the first visual concept, the team tried to create a character of the voxel image and created characters from classes commonly found in RPG games. Archer was created as a representative character; process took 40 minutes. After setting keywords that can determine styles while creating buildings, it became relatively easy to create similar styles of artwork. In order to create a character, various prompts were entered and repeated until the desired artwork was obtained.

The team wants to develop an Archer character design that incorporated multiple stylistic elements, including voxel graphics, Warcraft 3-style deformations, Supercell-inspired colors, and a dynamic pose that effectively conveyed the action of firing arrows. To accomplish this goal, the team input several prompts to generate Archer characters that aligned with team's design objectives. Additionally, the team included specific keywords such as bow usage, attacking and shooting an arrow, to generate a posture that accurately reflected the character's role as an archer. To further refine the design, the character images were generated repeatedly with the same prompt until the desired appearance was achieved. This iterative approach allowed us to enhance the character's visual impact and optimize the design for maximum aesthetic appeal (Table 2).

Table 2. Generated archer images with various prompt

Result	Images	Prompt
Selected		voxel 3d, voxel pixel art of supercell color, Medieval archer character, game character, using a bow, attacking, shooting an arrow,' witty shape, large top and small bottom, warcraft character shape, isometric voxel::3, bright atmosphere, vivid colors, made with three-dimensional pixels, super deformed, pixel art intricate, pixel art, hd, 3d, unreal engine, realistic photograph, hyper real hyper detailed. diorama, mounted on a square pedestal with multicolored tiles. bright background, full frame shot --q 5 --ar 2:3 --s 800 --no beard --no cross --no skull

Rejected		voxel 3d, voxel pixel art of supercell color, Medieval archer character, game character, witty shape, large top and small bottom, warcraft character shape, isometric voxel::3, bright atmosphere, vivid colors, made with three-dimensional pixels, super deformed, pixel art intricate, pixel art, hd, 3d, unreal engine, realistic photograph, hyper real hyper detailed. diorama, mounted on a square pedestal with multicolored tiles. bright background, full frame shot --q 5 --ar 2:3 --s 800 --no beard --no cross --no skull
Rejected		voxel 3d, voxel pixel art of supercell color, Medieval archer character, game character, using a bow with both hands, attacking, witty shape, large top and small bottom, warcraft character shape, isometric voxel::3, bright atmosphere, vivid colors, made with three-dimensional pixels, super deformed, pixel art intricate, pixel art, hd, 3d, unreal engine, realistic photograph, hyper real hyper detailed. diorama, mounted on a square pedestal with multicolored tiles. bright background, full frame shot --q 5 --ar 2:3 --s 800 --no beard --no cross --no skull

Following the creation of a character using Midjourney, a paired illustration based on this image was generated using Novel AI, which proved to be efficient. In the game, voxel characters are used as in-game resources, while illustrations can be used as images to be displayed on character acquisition and picture screens. Novel AI was suitable for such purposes because it creates illustrations while maintaining a sense of shape and pose. However, the shape of the fingers was unnatural, and the perspective was awkward. Moreover, it was challenging to produce other styles as it was created mainly with images that were close to anime-styles. The process of creating the illustration took place within an hour, and the quality was evaluated as a result that could be applicable for the game if a human designer polished a generated artwork.

Table 3. Combination of artwork from Midjourney and artwork from Novel AI

Character Type	Generated by Midjourney	Generated by Novel AI	Prompt for Novel AI
Archer			american game art style, archer character, rpg game character, masterpiece, highres, high_quality, high_quality_anime, high_resolution, sidelighting, super detail, hyper detail, intricate_details, detailed *sth*, {{archer}}, sleeveless green onepiece wear, green hair band, white long bow, blond short hair, bowstring pose Strength: 0.75 Noise: 0.03

The Designer's next attempt was to create concept art for the game's main character, utilizing Midjourney to generate as many different images of the same person as possible, given the same prompt. The result was an illustration that, while slightly different, could be categorized as a character from the same game. Images could not be used as game resources in an animated form, but still useful to share the designer's vision by showing different aspects of the characters to describe the game world. For the main character concept art, the team decided on the following character. "A small, student character around 15 years old, wearing a hooded sweatshirt and leather boots, carrying a backpack going on an adventure." The description as in 'Concept image' from Table 4 was applied to Midjourney.

Midjourney allows for the inclusion of images as well as text in the prompt. The generated criterion was used to assemble the image of the character with a different appearance. The "https://s.mj.run/pZdrd5MQY_c" component in the prompt refers to the link of the reference image used, and the command was entered to reference the image which is 'Concept image' in Table 4. As a result of execution of prompt that shown in Table 4, three different images (image1, image2, image3 in Table 4) were created that were thought to be the same character as the original concept image. However, not all of the desired settings were applied as anticipated. Specifically, the study attempted to create a fantasy in which a part of the character was transformed into a voxel but was unsuccessful in doing so. Generating unlearned results that were not generally accepted was a challenge still.

Table 4. Main character concept artwork and variation art works generated with Midjourney

Image Type	Generated Image	prompt
Concept image		a school girl with a back pack, Floating slightly in space where voxel 3d pixels are happening on the floor, Part of it is changing to voxel 3d, 3d illustration, front view, A schoolgirl looking at her hands in amazement, both hands turning into voxels, Two hands are in voxel 3d, Hooded sweatshirt, leather boots, Amazing anime style + tanned skin + impressive detailed doe eyes + intricate detailed brown hair + detailed face + smug expression + wear headphone, intricate hyperdetailed outfit, doe eyes, dynamic pose, very very cool and gorgeous illustration, hyperrealistic, octane render, hyper realistic, detailed petrified angel, location tomb, ultra detailed, dynamic lighting, atmospheric lighting, natural light effect, 32k, super-resolution, intricate, cgi
image 1		<https://s.mj.run/pZdrd5MQY_c> a school girl with a back pack, Floating slightly in space where voxel 3d pixels are happening on the floor, Part of it is changing to voxel 3d, 3d illustration, front view, A schoolgirl looking at her hands in amazement, both hands turning into voxels, Two hands are in voxel 3d, voxel 3d, Hooded sweatshirt, leather boots, Amazing anime style + tanned skin + impressive detailed doe eyes + intricate detailed brown hair + detailed face + smug expression + wear headphone, intricate hyperdetailed outfit, doe eyes, dynamic pose, very very cool and gorgeous illustration, hyperrealistic, octane render, hyper realistic, detailed petrified angel, location tomb, ultra detailed, dynamic lighting, atmospheric lighting, natural light effect, 32k, super-resolution, intricate, cgi --ar 9:16 --v 4 --no backside

image 2		<https://s.mj.run/pZdrd5MQY_c> a schoolgirl with a back pack, Part of it is changing to voxel 3d, 3d illustration, front view, A schoolgirl looking at her hands in amazement, both hands turning into voxels, Two hands are in voxel 3d, voxel 3d, Hooded sweatshirt, leather boots, Amazing anime style + tanned skin + impressive detailed doe eyes + intricate detailed brown hair + detailed face + smug expression + wear headphone, intricate hyperdetailed outfit, doe eyes, dynamic pose, very very cool and gorgeous illustration, hyperrealistic, octane render, hyper realistic, detailed petrified angel, location tomb, ultra detailed, dynamic lighting, atmospheric lighting, natural light effect, 32k, super-resolution, intricate, cgi --ar 9:16 --v 4 --no backside
image 3		<https://s.mj.run/pZdrd5MQY_c> 3d illustration. a schoolgirl with a backpack. She is making a surprised expression while looking at her hand. Light Blue Hooded sweatshirt. Dark Blue Short Skirt. Brown leather boots. Blue Backpack. Amazing anime style + tanned skin + impressive detailed doe eyes + intricate detailed brown hair + detailed face + smug expression + wear headphone, intricate hyperdetailed outfit, doe eyes, dynamic pose, very very cool and gorgeous illustration, hyperrealistic, octane render, hyper realistic, detailed petrified angel, location tomb, ultra detailed, dynamic lighting, atmospheric lighting, natural light effect, 32k, super-resolution, intricate, cgi --ar 9:16 --v 4 --no backside --s 300

The game designer was required to create both concept artwork and simplified voxel characters to reside in a virtual village. Using Midjourney, the designer produced Minecraft-like voxel characters that were suitable for the concept image. The prompt was created by adding two reference images. In the case of simplified voxel characters, the density of descriptions is reduced, allowing for recognition of the same character based on matching hair color, hair style, shirts color, and skirt color. A prompt was then written based on such observation.

Surprisingly, during the execution of the prompt, Midjourney automatically generated an image that was assumed to be the back of the same character. Although the image was not intentionally created to depict the same person, as the description of the bag was not the same, it was possible to generate multiple images with different compositions in one frame simultaneously, as shown in Table 5. Once a suitable method for generating multiple angles of the same person is found, this could be very useful. A repeated attempt to generate different compositions of the same character was ultimately unsuccessful.

Table 5. Generation of simplified voxel art matching concept illustration

Input images	Generated Image	prompt
		<https://s.mj.run/353L2oymjPY>, <https://s.mj.run/-5r6L5slacM> Draw a student character made with the exact voxel standard. Draw the x-axis, y-axis, and z-axis in a standardized form so that they do not clump or diverge, girl with backpack, Gender: Female, Archetype: Adventurer, Body Type: Small, Hairstyle: ponytail, Scheme: Brown and Blue, Clothing: light blue hooded T-Shirt and dark blue Shorts, Features: Small and Cute, Wide Eyes, Button Nose --s 300

Project NOX, much like the compared project Walking Dead: Identities's section "User Experience on Early Stage", includes a section titled "Expected User Experience." This section uses images and mockup visuals to describe the progression of the early stages of the game. The game designer tried to use generative AI to create storyboard images and experienced a highly efficient process in creating images and enjoyed a more creative control over the direction of the project.

Generating storyboard images with generative AI was not as successful the generative AI could not depict the same character from different angles, nor could it create a sequence of actions of the same character despite numerous attempts with different prompts. Efforts to create a storyboard for the opening video using text commands alone did not yield meaningful results. As an alternative, the designer opted for a conventional approach by outsourcing artists to create sketches. However, the coloring process was still aided through the use of artificial intelligence. With no artistic skills, the game designer colored the provided sketches from external sources to convey the intended atmosphere. These images were then used to create the proposal document to describe the early-game experience.

The "Expected User Experience" section of project NOX consists of 46 opening movie images and 60 gameplay scenes. The storyboard images in project NOX follow a format similar to Figure 5, with images accompanied by descriptive scripts, audio explanations, and VFX details. The game's storyline was crafted by an in-house junior game designer, and the storyline was then conveyed to outsourced experts who created storyboard images. The junior game designer received the concept sketches drawn with pencil strokes and used the Webtoon AI Painter, provided by Naver Webtoon, to colorize them.

Figure 5. Example images from storyboard of project NOX*

The game designer proceeded with coloring by specifying the desired colors for specific objects within the images, and the software automatically filled the entire scene accordingly (Figure 6). It took the Game Designer approximately 9 hours to color all 46 opening movie concepts. While technically it took less than 5 seconds to color one concept, repetitive adjustments were made to achieve the desired atmosphere. Consequently, it took about 10 minutes per image to complete.

* The original proposal is written in Korean. It has been translated into English for the purpose of the paper.

Figure 6. Paired images of sketch before coloring and sketch after coloring from project NOX

During the proposal document preparation process, the game designer utilized generative AI to quickly generate intended characters and buildings, streamlining the creation of storyboard images and altering the process. This change led to increased efficiency in game design and provided greater creative freedom.

However, during the development process, it became apparent that the technology has certain limitations that can affect the quality of the final output. One of the major limitations of generative AI was observed with Midjourney, which often generated images with incorrect perspective and incorrect number of fingers, particularly with character images. In particular, when attempting to generate images with prompts that required specific details, the resulting images often did not accurately reflect the intention. For example, when using prompts to specify details like a character having a ring on a particular finger or defining the position and shape of a chimney on a building, the specific designs were frequently either inaccurately portrayed or omitted in the generated results. Designers should note the limitation of the generative AI's inability to convey intricate details through image representation and seek alternative ways. Additionally, the tool was not effective in generating multiple poses of the same character and could not generate the necessary resources to create sprite animations.

The study also evaluated the use of Novel AI and Stable Diffusion, which generate images based on sketches. However, the images generated by these tools did not align with the intended design objectives, and often produced images with a different feel than what was desired. Table 6 highlights an example in which a sketch of a building was inputted into Novel AI to generate a voxel-style building. However, when increasing the style, the shape was not maintained, and when a value was set to maintain the shape, the style was not applied, resulting in an undesired image.

Table 6. How variation in prompt changes the image in Novel AI, following prompt "building, voxel style, masterpiece, high-res, high-quality, high-quality-anime Strength: (variable) Noise: 0.03"

Input sketch	Strength 0.3	Strength 0.4	Strength 0.5	Strength 0.6	Strength 0.66
					

There were other limitations in the use of generative AI. Firstly, despite numerous repetitions, the design of the user interface (UI) was not successful. The UI design process had to follow a generic approach, and the designer directed the assistant designer to find reference works with a similar look and feel. The artist was then tasked with adapting the UI from those reference works for use only for the proposal stage. During this process, a small number of unique button icons and other elements were generated using generative AI, but the productivity improvement in this stage was very limited.

Secondly, looking to generate something entirely original would not work as keywords such as 'never seen before' did not work. In light of such challenges, it would help the designers to note to generate images with meaningful differences rather than asking images that are beyond pre-trained models.

5. FINAL DOCUMENTS AND PROPOSAL RESULT

The subsequent processes following the game design proposal can vary depending on factors such as region, target market, game genre, and specific cases. Typically, investors or publishers don't outright reject or accept a proposal; instead, they engage in discussions to modify the proposal's content and may request revisions before moving forward to the proposal stage again. In the case of Walking Dead: Identities, several parties were involved: the Com2us Group responsible for executing the investment and the IP holder, Skybound, the comic book publisher. Both companies had multiple layers of approval chain within their organizations. Specifically, when pitching the project to Skybound, initially presentation was to their operational teams or relevant department within the company. After receiving feedback and input from these operational teams, a modified slide deck was then used to pitch the game design to the author of The Walking Dead. This multi-step approach allowed for refinement and alignment of the proposal with the expectations and objectives of all involved parties.

The game designer had to make modifications to the images from the first proposed document including adding images to describe the initial experience (Figure 3). When preparing the Walking Dead: Identities proposal, the game designer was outsourcing key characters, background images, and concept images. However, the artist responsible for creating the images for the initial proposal had left the outsourcing company. The game designer and the outsourcing company's manager attempted to replicate the style of the images used in the first pitch but were unsuccessful. The images included in the initial proposal had a comic book feel with emphasized pencil lines and subtle shading. In contrast, the images for the second proposal had strong shading with a broad and intense style. This image was created with thick and dark ink-like strokes, significantly differing from the first drawing (Figure 7). The game designer wanted to maintain the style of the left image in (Figure 7) but was unable to find an artist capable of replicating that style, and the newly joined artist had difficulty matching the existing style. As a result, the game designer decided to take the overall mood of the game in a darker direction compared to the images proposed in the initial pitch. This decision marked a shift in the project, focusing more on the gloomy setting of a zombie apocalypse.

Figure 7. Image of Rick(left) for the first pitch and image of Rick(right) for the second pitch

In the case of project NOX, there were two pitches. The first pitching took place in early April of 2023. During the first pitch, the game designer proposed a core idea that combined elements of a town builder and an RPG game, with focus on battle content. The strategy behind this proposal was to leverage proven game ideas from the market and deliver a new game with a unique world setting and storytelling with a faster pace. Following the first pitching, such strategy was modified to design a unique game system that did not exist in the market, even to the fundamental design level. Eventually, the team proceeded with the second pitching phase with the goal of introducing innovative and distinctive game system into the project.

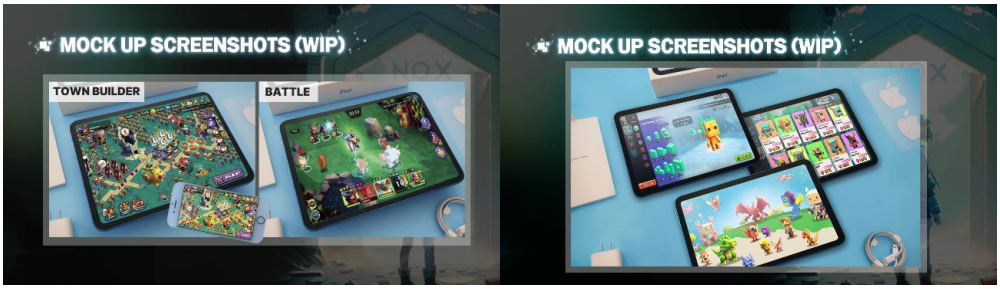

Figure 8. Mock up screenshots for the first pitching (left) and Mock up screenshots for the second pitching (right)

During the preparation for the first pitching, the original team headed by the game designer, consisted of three members, including an assistant designer and an artist. They took a little over a month to prepare for the second pitching which took place in the June of 2023. This marked the conclusion of the proposal process for project NOX.

In general, proposal pitching is typically conducted by a producer or the lead game designer. Therefore, once the pitching process is completed, the game design ideas and artwork modification details derived from the pitching to be explained to a team consisting of various roles for the next phase of work. During the process, loss of context can occur during communication and to mitigate such issues, additional paperwork is needed.

However, in the case of project NOX, the team responsible for proposal preparation was small consisting of only three members, with two of them directly involved in the pitching process. The two team members who attended the pitching session also took on the role of game designers, using generative AI to create artworks. This setup minimized content and time loss during the communication process. Furthermore, as the team prepared for the first pitching, the game designers became trained in the methodology of utilizing generative AI, and they had accumulated a set of prompt commands that became valuable assets to the team.

The game designer was able to efficiently generate consistent style artworks by making appropriate modifications to the existing prompts. The team spent approximately three months preparing for the first pitch, creating two key game systems, two mock-up screenshots, and various other images. The second pitching documents were developed over 1.5 months, during which two additional major game systems were designed, and improvements were made in efficiency generating three more mock-up screenshots (Figure 8).

Measuring the efficiency of the game design proposal preparation process isn't solely dependent on the increase in the number of individual images or designed systems. However, with the introduction of generative AI, the game designer is able to generate more images in a relatively short amount of time while still focusing on their primary task of game system design. project NOX, compared to the preparation process for Walking Dead: Identities, was completed with approximately 50% of working hours and about 20% of cost in terms of resources. Furthermore, there was an efficiency improvement between the preparation process for the first pitching and the second pitching of project NOX. The synergy achieved during the process was a result of improved communication efficiency among the research team members, the enhanced capabilities of the game designer in utilizing artificial intelligence, and the accumulation of prompt command assets.

6. CONCLUSION

This study highlights the emergence of a new era in which designers and artists who possess the skills to create effective and creative prompts, and who have access to super assistants such as Midjourney, Stable Diffusion, and Novel AI creative, can become a ‘super game designer’. Aside from cost and time savings, the most significant difference for game designers is the ability to visualize their creative thoughts without losing them in communication. However, the designer could now broaden the domain of game design even further. For example, the game designers can narrow down what kind of game they want to make without the help of marketing or strategy departments by using market sensing, that is, testing what kind of format, genre, and visuals the market responds to by sending out feelers made with generative AI. Furthermore, with very well-structured trained designers can even create a playable prototype by generating the necessary C# code for Unity3D using a service such as chatGPT. This would be a huge change from the traditional game design process and would actually change the production phase and the overall structure of how game companies do the business. While generative AI has the potential to revolutionize the game design process, there are still limitations and challenges that must be addressed to fully realize its potential.

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