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The Strategy and Implications of Space Narrative Used in the User Experience Design for Mixed Reality Marketing Scene

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Abstract. With the development of technology such as AR/VR/MR, the mixed reality is being used in the marketing scene more and more frequently. But how can these new applications have been accepted by clients and customers in the big commercial space such as commercial complex in the urban center? What is the framework and design strategy for mixed reality implementations in these spaces? Space Narrative, as a space experience design tool, has been used in various types of space and scene, including commercial space. This paper discusses how to combine associated mixed realty interaction scene coherently through story or scenario, in order to enhance the connection between customer and space and empower the marketing campaigns in the commercial space, and finally upgrade the efficiency and revenue level of the space. It requires a cutting-edge implementation of new design strategy and practice with feedback. Thus, this paper also explores a practical project with mixed reality-oriented space narrative design. Based on the project, we look through the information transformation for sale and user experience and acceptance of the according mixed reality applications, and try to construct the strategy of approaches for mixed reality space narrative and the framework of its assessment、iteration and evaluation.
Keywords. Space Narrative, Mixed Reality, User Experience Design, Commercial Space

1. Introduction

1.1 Mixed Reality and Commercial Space

Augmented reality (AR) is an emerging technology. It is not brand-new stuff for recent years. Actually, the history of exploring displaying digital data in the physical world can date back to the very early days of computer science. In 1968, Ivan Sutherland, a computer scientist, and his team created a machine named ‘The Sword of Damocles' which is widely considered as the first virtual reality head-mounted display system. (HMD)(Sutherland, 1968).[1] The original graphics quality of this device is not perfect at all: it can only render a wireframe room in the simplest way. Approximately the same time, the concept of ‘cyberpunk' is also been coined as an independent cultural subgenre of science fiction, mainly concerning the futuristic technical achievements and radical social order change (Hassler, 2008)[2]. The virtual reality industry has mainly been developed for providing VR headset devices for industrial purposes in the coming years between the 1970s to 1990s.[3] During this period, the subgenre of cyberpunk also inspired the creation of literature and artistic work.[4] Early films include Blade Runner in 1982 gives the public a glimpse of what the world and city

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will look like when digital and physical environment intertwined together.[5]
The first commercial augmented reality (AR) device as mass consumer goods are the Google Glass, released by Google on April 15,2013.[6] But lacks the ability of SLAM (Simultaneous localization and mapping) [7], and the FOV (Field of View) [8] of its micro display is small. In 2010, Microsoft firstly introduced mixed reality devices: HoloLens. It solved the problem of SLAM. As a competitor, the most recent news is the release of Microsoft HoloLens 2, on February 24,2019. With better interaction system and even bigger FOV Microsoft HoloLens 2 pushes the immersive experience of mixed reaHty to a higher level.[9] Along with the development of AR glass or headset, mobile devices are also been used as the display platform. Apple and Google both released its software tools of transforming smartphone or tablet PC to AR devices in 2017. They are ARkit (Apple) and ARcore (Google). With all these developments, the process of building the urban mixed environment with Augmented Reality technology is entering an accelerating fast lane.
Accordingly, this new technology been used in various types of spaces. Commercial space, as the center of urban life, is also on the list of implementation category. Many commercial organizations view mixed reality as an efficient tool for offline space to compose interaction with customer.

1.2 Question and Problem of MR in Commercial Space

With the formation and deepening of the demand-side segmented, personalized, and quality consumption trends, the comprehensive demands of emotional consumption, cultural consumption, experiential consumption, and scene-based consumption are becoming more and more intensive. Commercial space operators need to keep pace with the time and create more more attractive and competitive new consumption scenarios and new services. Despite the trend of fast development, current applications of mixed reality in the commercial space are still in an initial phase.
On the one hand, many mixed reality scenarios and applications are very fragmented, so they cannot meet the complex business and marketing needs in the commercial complex space. On the other hand, the interactive form of mixed reality applications is still developing, and how to better integrate with the large-scale offline space is still a difficulty. Considering that interaction design needs to be based on technical support, the current mixed reality technology still needs to be closely integrated with the environment to achieve effective interaction organization.

Figure 1: Mixed Reality Environment and Digital Content

1.3 Current Mixed Reality Technology and its application trends

With the development of computer vision technology, it has become possible to perform 3D modeling based on point cloud environment for a larger range of physical space. Through 3D reconstruction, we can rely on computer vision images to generate high-precision spatial point clouds. After matching the corresponding algorithms, these 3D models based on spatial point clouds are digital representations of physical spaces/objects, including the extraction and extraction of image feature points. Matching, motion recovery structure,3D geometric reconstruction, surface texture reconstruction and other core technologies. With the 5G network, rendering will be migrated to the cloud, using the powerful computing power of the cloud to Realize high-fidelity physics simulation, occlusion processing and virtual-real interaction, as well as accurate lighting estimation, realistic rendering and virtual-real fusion effects. In the future, on the basis of 3D reconstruction and rendering technology, AR will be deeply integrated with AI technology. The scale of virtual-real integration scenarios will also become larger and larger. Therefore, it becomes technically feasible to integrate multiple types of digital content and applications in one space through one application portal.

2. Framework of Space Narrative used in the Mixed Reality Commercial Space

As a media design method and information organization tool, narrative has rich applications in many design fields. A narration can be composed by text、image and video. In the historical process of media and information development, spatial narration has developed into a widely accepted design method used in the creation of space experience. in all aspects.

Mixed reality, as an interactive space digital transformation technology, can push multi-modal interaction methods to consumers' smart terminals through specific Web rendering algorithms, including (smart phone, smart glass, interactive large screen, etc.), forming a rich interactive environment. The mixed reality digital commercial space based on 5G, and the lightweight entrance allows the plot and experience to be integrated into the different interaction modes. It becomes more natural in the real business experience chain.

By means of mixed reality, the relevant elements of the project are organically integrated and expressed in the space, combined with the form of interaction acceptable to consumers.

2.1 The Construction of Space Narrative Design Method

The narrative is often seen as a form of representation bond with sequence, space and time (Cobley, 2001).[10] It is also regarded as the activity of selecting, arranging and rendering story material in order to achieve specific time-bound effects on a perceiver (Bordwell, 1985).[11] From the perspective of the dichotomy with narrator/reader, space experience is a similar system with the designer/viewer, as well as the interactive scene with the urban designer/visitor. This dichotomy is a process of producing knowledge and building cognition. It also linked with the dichotomy of conceptual formation and perceptual experience of the space and form.

Spatial storytelling is a design method that combines various information in space, and designers need to organize elements of various meanings through an organic sequence. Whether it is the relationship between spaces, the relationship between various elements within the space, or the relationship between elements, the structure of the

organization's response to the result is information transmission, which will affect the intuitive reading experience of the experiencer in the space. In the design system of spatial narrative, narrative scene, narrative form, and narrative experience are three sets of parallel sets of elements, and in them there are subsets of space elements of different scales such as architecture, decoration, and furniture. For narrative forms, semantics and grammar are two sets of narrative influence factors that influence each other but are equally important. The narrative experience includes richer connotations, from human figurative senses to abstract cognition and behavior, and every type and interaction result between people and the environment and between people is part of the narrative experience. The system of these three sets of elements provides the narrator with a basic method for constructing conceptual space and perceptual experience, and the element itself can also be a method. In the process of communicating with the reader through spatial design, this connection will be reflected in each step of the process of establishing spatial cognition.

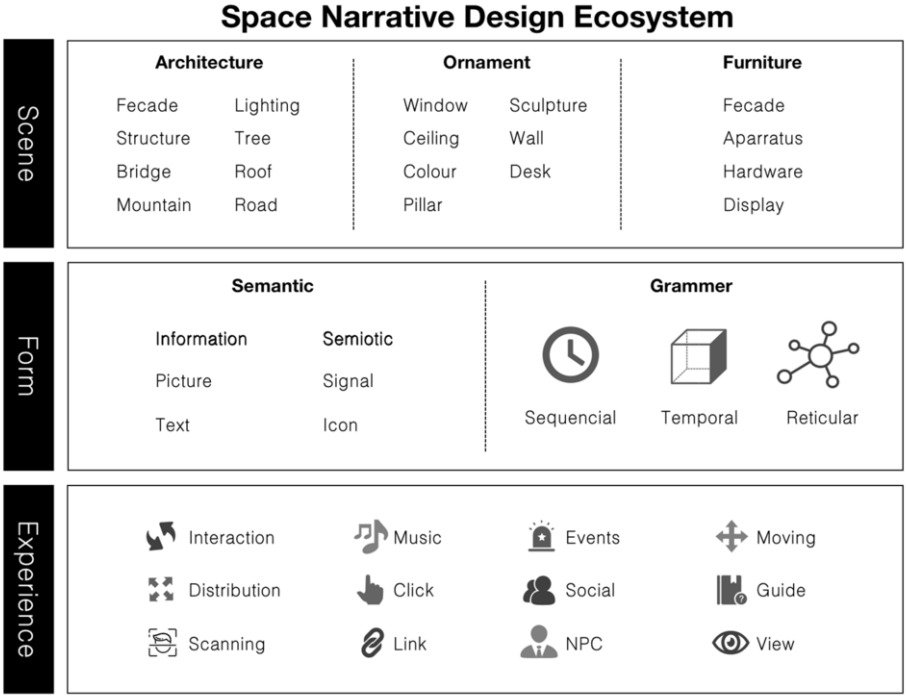

Figure 2: Space Narrative Design Ecosystem

2.2 Space Narrative Structure Based on Game

In order to research the narrative structure of mixed reality medium. It is necessary to discover the existing narration. Apart from the architecture and architectural space, looking through another type of medium and its unique technique can reveal a broader view of how mixed reality can potentially expand the possibilities of the nativity for a MR space. The narrative exists in almost all kinds of mediums and human activities: speech, literature, theater, comic, song, film, visual art, game and so on. During the long period time of development, a linear medium such as film or literature has developed an extremely comprehensive system of the narrative. It would take way too much space to list all the tactics and strategies of the tools.

The video game is the most relevant type of digital medium when it comes to the angle of activities a people can introduce through MR. And it is already developed for a long time. Thus, exploring the tools of narration in gaming could provide a predictive view of what could augment reality achieve when it is applied to the visitors' perceptual experience in a space.

One big difference between the game and another type of medium is the interactivity. The traditional narrative is a static set of arrangements and often end up with a similar impression of the story been told, the interactivity of game allows the existence of multiple developments and experiences of the player. None privileged story can be told from the angle of game designer, the interpretations and choices of each player could allow the open ending or developing a process of the game story to be possible.

There is two basic kinds of narrative to identify the methodology of constructing a story for a player in a video game: embedded narrative and emergent narrative. Sometimes, it is also emerged based on the interactions between multiple players in some online game. The game design is about the balance between these two big types of narrative. With these two tools, one story line can grow up to various signs of progress and multiple endings.

Interactivity significantly expanded the possibilities of what message could the visitor get from the MR special experience.

2.3 Mixed Reality Interaction and Relative Narrative Strategy

As an emerging technology, mixed reality has a relatively specific interaction method, and many mixed reality products are in the state of multimodal mixing.

Different information reception and interaction methods have corresponding applicable scenarios, so each interaction has corresponding narrative scenarios and elements. The characteristics of the terminal equipment suitable for consumers determine the way of interaction. For example, consumers who are suitable for mobile phones mainly rely on click events for their interaction, while for consumers who are suitable for smart glasses, their interaction methods will include more gesture recognition.

In a larger interaction space, gesture recognition combined with voice and Visual interaction is also possible. Smart glasses will also expand the corresponding range. Based on the current status of devices, clicks, gestures, and voice are the most widely used forms of interaction in products, so in a wider range of applications, narrative implantation in this area has a wider range of applications. Click-based interaction can support the operation of objects and interactive objects through buttons, drag and drop, etc., which includes most of the existing narrative modes and interactive forms of plot interaction units in current digital applications. The sequence of experiences can be organized at the overall frame level through the choice of stories and scenes by click.

2.4 The Narrative Experience of Scene and Context in Mixed Reality Space

Immersion is the highest experience of narrative experience. The specific expression technique depends on how the expressor wants the recipient to feel. As mentioned above, certain narrative tools can be made to pay for consumers through some interactions. Constructing a narrative experience that integrates with the environment and scenes can give the viewer a stronger sense of immersion and achieve an organic combination with marketing activities.

First, narrative relies on reasonable scene perception.

If the experience or space changes without premise, it will show an extremely strong sense of disobedience. A reasonable environmental narrative needs to have two

elements, the rationality of the narrative logic and the authenticity and credibility of the space.

Narrative logic means that any experience needs to have a reasonable reason for the viewer to integrate into the world of digital experience based on it, that is, the projection of players' emotions;"space" is the stage for display, and it also needs to be authentic. Without the customer, there would be no narrative subject, and the spatial change would not be able to mobilize perception, and participants would feel that it was someone else's business, not me;

The space provided by the mixed reality structure has a strong sense of disobedience. No one cares about what happens to the self-narrative subject, and the customer will feel that it is fake anyway, so they will not care. This feeling is more logical.

On this basis, from the design level, we should also consider whether our logic construction is complete in this perceptually reasonable narrative experience, and are there any incongruent visual elements? Are the actions guided by the plot logical? Including whether it is convenient enough for consumers to interact with the space.

In the commercial space, the context includes the location of the shopping mall, the goals of the marketing activities, the characteristics of the operating organization of the marketing organization in cooperation with the product, the larger market theme, the spatial form of the shopping mall and the characteristics of the building facade, and the marketing of the IP elements of the commercial space. background and so on. A reasonable narrative design related to the scene and the environment needs to start with the interactive experience and visual elements from the environmental experience, run through the entire interactive chain, and bring smooth feelings to consumers at the cognitive and experiential levels.

2.5 The Narrative Experience of Role and Interaction in Mixed Reality Space

For the consumer, it is itself a character in a narrative experience. Objects, NPCs, and NPCs that interact with them during the narrative process can be regarded as character interactions driven by the plot. Whether it is the characters set by the narrator in the scene or the participants themselves.

Character positioning refers to what kind of role this person plays in the whole plot, and what role does it play in the progression of the plot. Whether it is the experiencer himself or the character who needs to interact, the positioning of the character determines other parts of the subsequent design.

Whether it is setting the characters in the script or setting the plot in the space, we need to set a specific visual image to organize relevant experience elements. The original paintings or stills of the character images and temperaments we draw, and the setting pictures formed can help us to concretize the images we create.

Character traits are used to describe the person's way of thinking and behavioral characteristics, and this description is used to determine the person's feedback on conflict in the script. When a designer describes a character, it is easier to write multiple characters as similar to himself, because when we are setting the character, we cannot only consider the positioning of this character, and when we are dealing with multiple characters that appeared in the same period, It is necessary to make a unified assessment, and try not to be in too similar roles as much as possible. All kinds of characters with different personalities can make the plot fuller.

2.6 The Narrative Experience of Event and Scenario in Mixed Reality Space

"Event" refers to one or more daily activities of people in building space and time.[4] Architecture is a material system that meets basic functions and needs, and at the same time records and transmits information. Therefore, the architectural space goes beyond the definition of its original function - directly to "meaning" and "information". Through the organization of character behavior in the scene, events can move the relevant plot flow of the scenario, which controls the emotions of the viewer, including surprise, anticipation, frustration and fear. Arranging events so that the viewer's emotional curve ebbs and flows can make the experience organized by the narrative compelling.

Narratives can be interpreted either as a "single event" or as a combination of "a collection of events". The purpose is to integrate the value of entity and space, meaning and experience: any one of form, space, and function cannot completely occupy the space itself, but become an organic whole, forming the narrator (experience designer), the narrated (viewer) is based on a structural system and generates a network of constant communication and deepening of the depiction of meaning.

2.7 MR-SNDM (Mixed Reality Space Narrative Design Method)

Among them, the more traditional system elements, such as the environment and the scene, are the premise of a reasonable narrative experience. On this basis, the characters and events will promote the development of the plot through organic interaction. We can see that in this field, some more traditional techniques, such as linear narrative, non-linear narrative, modular narrative, scattered narrative, etc., can be applied. At the same time, there are also novel things at the level of space and experience, such as narrative forms that are closely integrated with technology and interaction, and character setting methods based on space and scenes. and many more. The following figure shows the relevant elements and complete structure of the Mixed Reality Space Narrative Design Method(MR-SDNM):

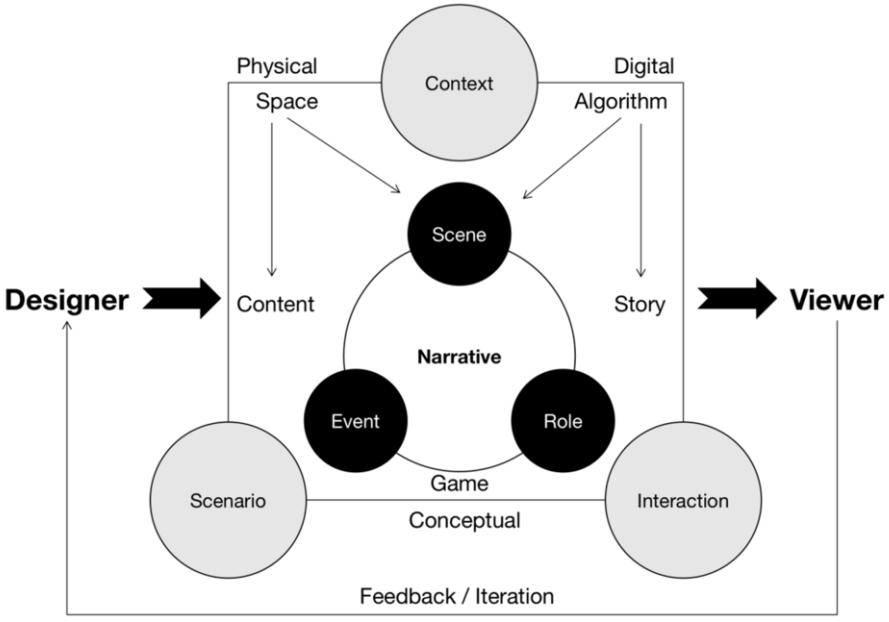

Figure 3: Mixed Reality Space Narrative Design Method

The interrelationships between these elements are organically integrated, and with the interaction methods and open content design methods brought about by technology, the above structure is not in a steady state, but a phased summary based on the existing conditions. In the following practice, we can see that the mixed reality space narrative design method faces both opportunities and challenges in the process of implementation.

3. Practice—Mixed reality experience design and research of JINKE commercial complex

Jinke Lefang Shopping Center is a commercial complex located in Chongqing, China, with a living community of nearly 50,000 people within a 3-kilometer radius. On the basis of optimizing the "experience" and "display" functions, with the positioning of "one-stop family gathering place", it is committed to creating an urban "parent-child micro-vacation" place and the first platform to provide consumers with better life services. The Jinke Lefang project has a total volume of 136,000 square meters and a commercial volume of 100,000 square meters.

Through the study of the venue, we found that the project faced several problems that needed to be solved: the volume and location limited the popularity and dissemination of the project, the single marketing method led to a very weak link between consumers and the space, and the merchants did not have the resources and willingness to actively promote. A tool is needed to integrate all participants in the business scene to promote the activity of business activities in the scene. Based on the principle of MR-SDNM, we first sorted out the spatial status of the physical site, which has three entrances and a small square, and the spatial form is a network-like divergent combination. At the same time, we found that consumers will stay in the atrium of the mall for a longer time, but there is no rich interaction to carry this stay behavior. Through communication with the operation team, we also learned that conventional space marketing methods are difficult to organically connect consumers with cold zone merchants. Therefore, we believe that a continuous interactive experience from outdoor to indoor has a chance of success in this business scenario.

Figure 4: Mixed Reality Scene Concept Drawing

The project is located in Yubei District, a developing new construction area in the north of the city, which is rich in young people and has many newly settled families. That's why we believe that young, imaginative scenes can inspire consumers to participate. In terms of style and background setting, we chose cyberpunk, a more recognizable and recognizable direction. The theme is called "Metaverse Invasion". At the same time, we combined three entrance views, a small square view, and an atrium game to connect the marketing points in a parallel way with an immersive experience. Combined with AR navigation, consumers can choose any space scene to enter the plot, bring from the main entrance to other points in step-by-step interaction, and finally experience the

entire commercial space. In the process of this shopping experience, we also implant marketing functions through the task system to guide consumers to complete consumption through cards and coupons.

This design strategy was approved by the project operation team and merchants, and finally produced and launched in October in the form of a strong combination with the commercial operator's digital portal (mini program).

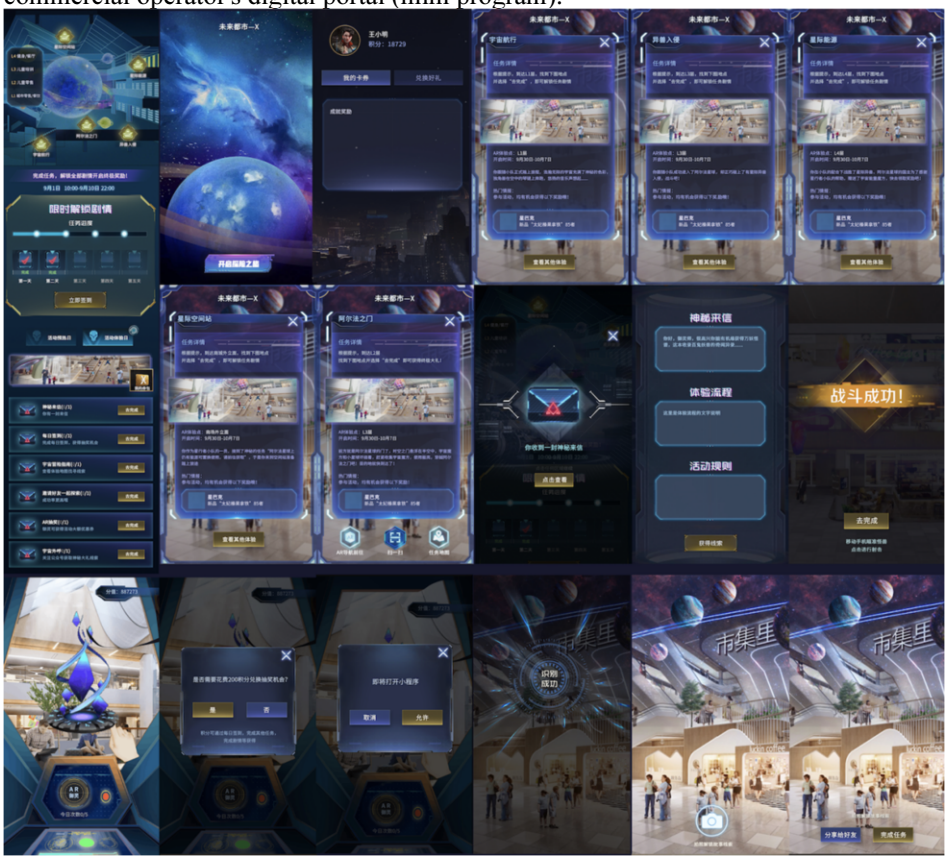

Figure 5: Design process diagrams of Interaction and User Interface

We integrate digital scenes into commercial buildings and spaces through design, and with entertainment forms in combination with the needs of marketing activities. In one continuous experience, we have constructed six related experiences, each based on cyberpunk style. The landscape punch-in and design games have been modularly integrated.

After completing the entire story experience, consumers and experiencers can receive rewards related to marketing activities and complete the closed loop of the entire marketing experience.

4. Performance and Evaluation

After the project was put on the market, it has generally received good feedback and effects. The customer completed the organization and promotion of the event through the story interactive product.

The following table shows the advantages of this project in the space marketing campaign: the sense of interactivity, immersion, and interactivity have brought significant data improvements to the project, and consumers' behavior in the space has become more active than before. We can see that traditionally, a marketing campaign has between 10,000 and 15,000 participants in the first five days, but this project has reached more than 18,000 people. And the interactive flow completion of the marketing experience has increased from the traditional 10% to 15% to more than 28%. It can be argued that innovative spatial interaction experiences can bring very good consumer engagement and completion.

However, we should also note that the unit price of consumers in the current project has not increased significantly. The per capita traditional consumption level of consumers in the mall and the current consumption data are the same from the perspective of per capita consumption. Therefore, the current project design has not yet achieved the purpose of promoting per capita consumption, and this reason may need further exploration and research.

It is also worth noting that the project has shown obvious advantages in online communication, media communication and government attention. Whether it was online views, media coverage or government attention, it significantly increased the visibility of an event, so the project also achieved brand promotion and venue promotion. This attention from the social side contributes to the continued healthy operation of the commercial space.

Comparison and Analysis of design output per unit time between traditonal marketing scene and MR-SDNM marketing scene

DATA of the peoject based on the first 5 days of a marketing project. The DATA of traditonal scene is based on the recent year's data.

Subjects Type	Traditional Marketing Scene (Average Assessment)	MR-SDNM Marketing Scene (This Project)
Number of User Partisipated	10000—15000	18336
Proportion of Experience Finished	10%—15%	28.62%
Proportion of Verification	8%—12%	16.35%
Daily Active Users	2000—3000	3667
Average Consumption (RMB)	200—300	286.18
Online View	20,000—50,000	over 100,000
Media Reported	1 — 10	36
Government Interest	No	Yes
Overall Performance	**Normal**	**Good**

* DATA source: Wonderlord Tech

Chart 1: Investigation of the Effectiveness and User Experience of the Project

From the perspective of user experience, mixed reality space, as a more innovative form of spatial experience, has generally gained more recognition. We conducted a questionnaire survey on consumers, mall operators and merchants, and three types of

experiencers, and obtained different degrees of evaluation. Among them, the overall acceptance of innovative experiences by consumers is higher than that of mall operators and merchants, and we learned through interviews that this is because the latter pays more attention to the input-output ratio, but not everyone recognizes the commercial returns of this new interaction model, and the relevant data needs to be tested in more projects in the future.

In addition, through a survey of more than 60 consumers who received responses, we found that consumers are the most sensitive to interactive experiences. For the overall creative and artistic appeal, consumer evaluation is at a high level, so in the subsequent design, the interactive experience should get more attention and consideration. Regardless of the overall framework and design, interaction will be central.

For small businesses, this project is a little less attractive because it has adopted a lot of different kinds of promotions in their daily marketing activities. For the operators of the entire mall, due to the series of plot interaction and narrative to the space scene, they have strengthened their ability to manage and use space content and digital experience, so they have been praised.

On the whole, consumers, mall operators, and businesses all have different demands, so they give different evaluations from different angles. At present, these evaluation dimensions can continue to iterate in the next practice.

Effectiveness and User Experience of the Project

An investigation for the outcome and design results of the project, from 2022.09.24 — 2022.10.07, full score of each subjects is 5. All person been investigated can provide their subjective assessment of the project.

Subjects Type	Attractiveness of The Project	Playfulness of The MR Space	Interactive Experience	Overall Satisfication
Customer (100 questionnaires were distributed and 64 responded)				
Team Average	4.65	3.77	3.82	4.25
The Operator of the Mall (10 questionnaires)				
Team Average	4.88	4.12	3.96	4.07
Small Business and Tenants in the Mall (10 questionnaires)				
Team Average	3.69	4.08	4.26	4.14

* This investigation begins after about 1 week of the project. Thus, the timeliness affects the judgement of people who partispated in this project.

Chart 2: Investigation of the Effectiveness and User Experience of the Project

The project has achieved relatively obvious success in business, but it should also be seen that there are still many unsolved problems in the project and further exploration. For example, the current game plot is relatively simple, and the total experience time is less than 15 minutes. We can only carry a limited plot in the limited experience time. In this practice, there is no relatively rich structural paradigm. At the same time, due to the limited exploration of interactive modes, this project has not achieved the extension of the gameplay, and has not fully explored the progress of the interactive mode. The visual unity of scenes, elements, and content is not good enough, and there are cases where the experience is abrupt. These issues need to be further improved and discussed in the next project.

5. Conclusion

This practice shows that spatial narrative, as an interdisciplinary design method, can organically connect various types of interactive experiences in mixed reality business environments, and combine them with marketing needs to achieve effective integration of marketing goals and innovative experiences. In the context of rapid changes in the form of information and media, through design innovation, it can respond to the needs of new business scenarios. However, we can also see that mixed reality space narrative is an organic organization of various elements such as interaction, plot, characters, and environment based on new technical conditions, and its related design methods and ideas are still in a constant development. in the process of. The solutions and practices mentioned in this article should be continuously reviewed and iterated in the follow-up work to better adapt to future development.

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