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A content service deployment plan for metaverse museum exhibitions—Centering on the combination of beacons and HMDs

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ABSTRACT

Today, methods of museum exhibition are rapidly changing. While focusing on visitors' museum experience, new display methods employ a variety of digital technologies to provide exhibition content in ways that allow visitors to better understand artifacts on display. However, the majority of such methods rely on one-way means of delivering information. The lack of interaction with visitors and the use of lighting that clearly separates real and virtual spaces have made museums inadequate as experiential spaces. To resolve those problems, this article suggests a plan to deploy content services for visitors' museum experiences by combining beacons and HMDs. This study establishes the concept of a service, which provides a virtual world experience by connecting a beacon installed in real space, that is, an exhibition room, to an HMD (head-mounted display). Furthermore, the service also incorporates a storytelling feature to diversify user experience by presenting the characteristics of and stories about artifacts. The service design will make both online and on-site museum experiences meaningful. Ultimately, this article presents the exhibition content thus created as Metaverse exhibition content made through an effective combination of augmented reality and a virtual world.

1. Introduction

The digital age has drastically changed the traditional definition of the museum. In the past, the entire experience in a museum has revolved around appreciating and getting educated about artifacts on display, whereas museums are now becoming more important as comprehensive social learning spaces. Such a change in the role of the museum has led to a variety of discussions about the museum space. The prevailing discussion concerns specifically the ubiquitous museum (Han, 2006). The focus of the discussion has evolved from the traditional museum to the modern museum, and from the cyber museum to the digital museum. While the traditional museum promoted preservation techniques for analog content, the modern museum contributed to the creation of images and other educational content aside from artifacts and subsequently to the development of exhibition methods. The internet age witnessed the creation of a cyber exhibition space in which digital content has evolved. The digital age, then, has unified online and on-site museum spaces while transforming the entire space of the museum using ubiquitous technology.

Along with the functional changes of museums, the content aspect of museum exhibition has also seen a change towards the expansion of experiential space. First, it means an exhibition space as physical space (Yoo, 2010); and then as electronic space, in which online information distribution takes place. Next is an exhibition space as ubiquitous space, which combines physical and electronic spaces where the spectator and the space interact with each another. Lastly, an exhibition space serves as an eXperience space. In this space, the spectator, artifacts, and devices are connected together and the user's content experience becomes an important element. Such changes have had a significant impact on the exhibition design of museums. Instead of merely involving displays, kiosks, and audio guides, creating user experience scenarios has become vital to exhibition design. It also means that emphasis is now laid upon user experience through a combination of digital technology and museum content. Now, museums need to come up with how to maximize spectators' experience beyond their experience of physical elements.

In these circumstances, the museum spectator's experiential content has rapidly evolved. When digital technology was first applied, online museum content has been transported over to mobiles thanks to widely available smart technology. It indicates not only a change in the means of delivering information, but also the expansion of the spectator's experience to aug-

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0268-4012/

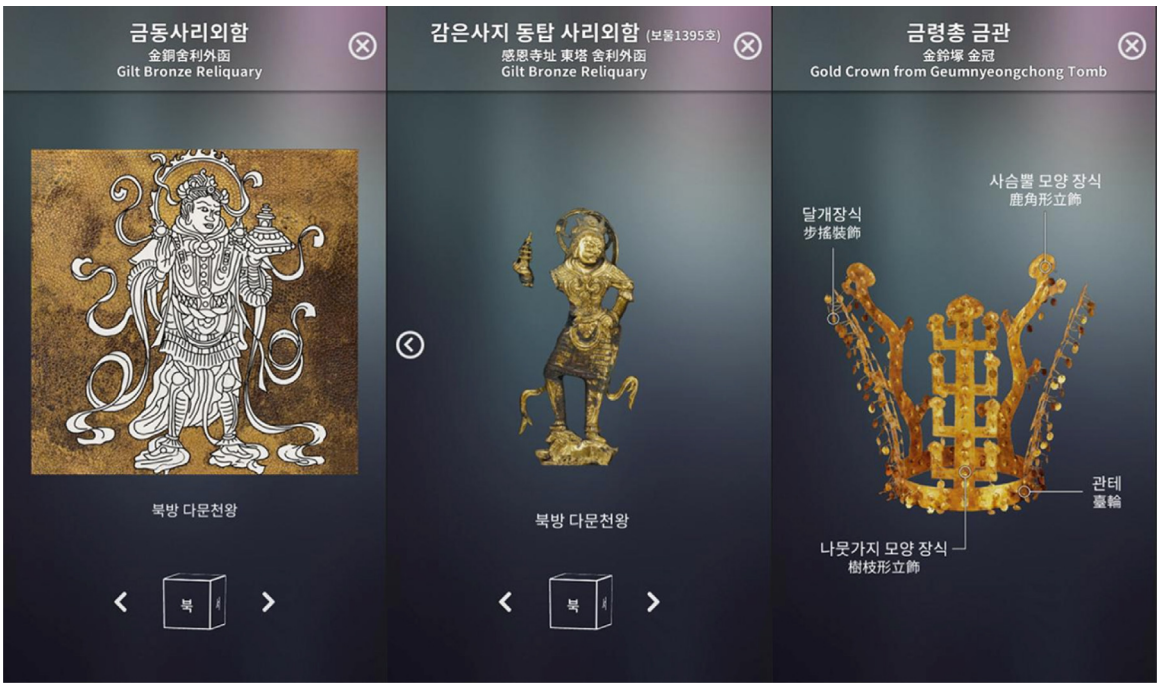

Fig. 1. The National Museum of Korea's augmented reality app screen.

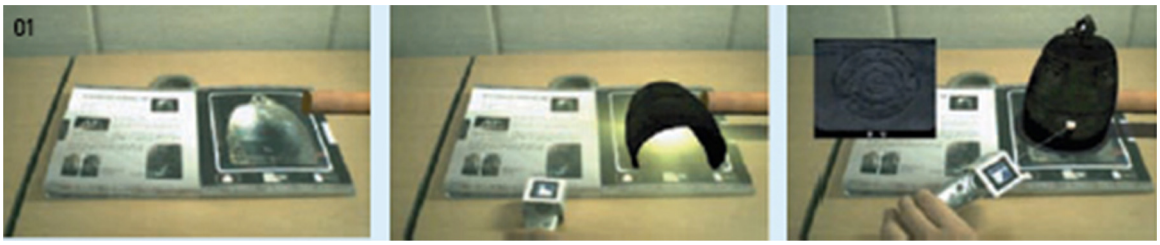

Fig. 2. Korean Beomjong (Buddhist bells) experience digilog book screen.

mented reality or virtual reality. Still, however, the content of spectator experience has not moved beyond one way of delivering information. With user experience scenarios not adequately translated to storytelling, technologies have been prematurely deployed. Examples include recently deployed HMD-enabled content or beacon-enabled location-based content services. This article explores how to provide spectator experiential content by deploying digital technologies, focusing on special exhibitions in museums. First, the article examines the current state of ubiquitous technology and museum exhibition experience. Second, it discusses the current state and limitations of technologies necessary for current museums to provide experiential exhibitions. Lastly, the article suggests the concept of a service necessary to maximize spectator experience in a museum include content management system.

2. Body

2.1. Current state of ubiquitous technology and museum exhibition experience

Ubiquitous technology has rapidly evolved along with the evolution of digital technology. Such an environment based on network and mobile technologies has led to the creation of a content environment in which real and virtual spaces are integrated through various sensors mounted on devices. In such integrated space, service providers and users have produced a great variety of derivative information through two-way information delivery. It distinguishes itself from previous one-way information delivery and creates a user-centered information environment. Such technological development has been accompanied by the evolution of museum content services. These environmental changes account for the recently shifting focus of museums to ubiquitous virtual reality. However, what is now called an evolved form of exhibition content is confined to the scope of augmented reality and virtual reality. It is true that the ability of a museum to provide content that cannot be experienced in real space by combining it with virtual space, in and of itself, is progress. However, to create more evolved exhibition content requires the convergence and deployment of ubiquitous technologies (Fig. 1). Content created through ubiquitous technologies has the following three characteristics (Woo, 2011). First, it connects reality to a virtual world. By linking the real world to its corresponding virtual world, it enables two-way interaction between those two spaces. Second, it augments the tangible. Augmentation of the tangible stimulates all five senses in three-dimensional space to give a sense of reality. Third, it allows for real-time two-way interaction. It technologically connects virtual and real worlds, adding naturalness and enabling broader experience of augmented reality. Among such forms of ubiquitous content, augmented reality-based ubiquitous content is most commonly applied. The most widely deployed smartphone