Toward the Synchronized Experiences between Real and Virtual Museum

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Abstract

This research starts from the idea that through synchronized experiences between real and virtual museum, users can achieve thorough comprehension on the heritage. We investigated the virtual museum by constituting the concept of virtual museum with the reciprocal real museum. Based on the fundamental purpose and role of the museum, we suggested a model of a virtual museum composed by a virtual museum server and interface orbit. A user can contact the virtual museum services in the virtual museum server through various devices as interfaces. For the future works, we are developing "Virtual Namsan" integrated with technologies mentioned in this paper.

1 Introduction : Real Museum vs. Virtual Museum

Rapid development of technology results in facing the new paradigm of museum. Such new challenges as extended types and attributes of media, the method of management, and the range and quantity of materials, require rethinking conventional concept of museum [1].

International Council of Museums (ICOM) defines the Museum as following [2].

> *"A museum is a non-profit making, permanent institution in the service of society and of its development, and open to the public, which acquires, conserves, researches, communicates and exhibits, for purposes of study, education and enjoyment, material evidence of people and their environment."*

Even though new technologies are changing the museum environment radically, the conventional museum and the meaning of that will be continuously crucial. The role and purpose of museum is characterized by some categories such as founders and administrators, contents of exhibition, and natures of inspectors [3]. However, throughout all kinds of museums, even including virtual museum, the fundamental museum functions are exhibition, communication, research, acquirement, and conservation as shown in the definition of museum above.

As the object of museum services especially in terms of exhibition, cultural heritages have been dealt by diverse methods. Besides conventional displays in the gallery, technology provides the new possibilities so-called a virtual heritage and museum. Many prior research and efforts have been devoted to the virtual museum; accordingly, in fact, there are a lot of virtual museums already. Though, it is not obvious to comprehend the general constitution of virtual museum. One of the reasons is because the range of technology and its application is so wide that users hardly catch up in consistence; and the other is because the concept of virtual museum comes from too technology-oriented perspectives to form common understandings. While some virtual museums offer just the information of the real museums and properties on the Web, the others afford highly operated realistic experiences based on the technical infrastructure. The former is the case that regards the term "virtual" as merely physically not existing but the latter as novelty never existed before. We can call them virtual museum in their own ways anyhow. However most of them pass over the lack of concern on the fundamental concept of museum, related to the conventional real museums and heritages.

In this research, we concentrated on defining the concept of a virtual museum and its virtual heritage in the fundamental viewpoint on the museum. We concern in the relationship between the real and virtual things in terms of the user/inspector's position. We suggest a model of a virtual museum and service; as a prototype, we selected "Virtual Namsan". Namsan is a mountain located at a Kyongju Historic Areas in Korea, which is granted World Heritage by UNESCO. It contains about 360 heritages including a lot of national treasures [4], thus it is worth implementing as a virtual heritage.

2   Overviews of Virtual Museum

Virtual museum consists of roughly two parts, a museum server and interface orbit. A museum server conveys the museum services based on databases. Interface orbit is a conceptual term to represent user's applicability according to devices. As illustrated in Figure 1, a user can contact the virtual museum services in the virtual museum server through various devices as interfaces such as an information docking station (InfoDock) in the museum studio, a personal computer for web museum, and PDA for pocket museum. In the position of virtual museum inspector, real museum and real heritage can be a kind of interface.

Museum services fundamentally are different from intention of a user. Users can be classified by three groups; Visitor/Tourist, Student/Educator, and Expert/Administrator [5]. The each user's needs are directly connected with the roles and functions of the museum. Virtual museum is involved with these roles and functions as well as real museum; inspection, research, communication, documentation, and storage [2]. We compose the virtual museum services reciprocated with real museum services. The services consisted of; immersive experience, four dimensional context explorer, innovative inquiry, and interactive annotation.
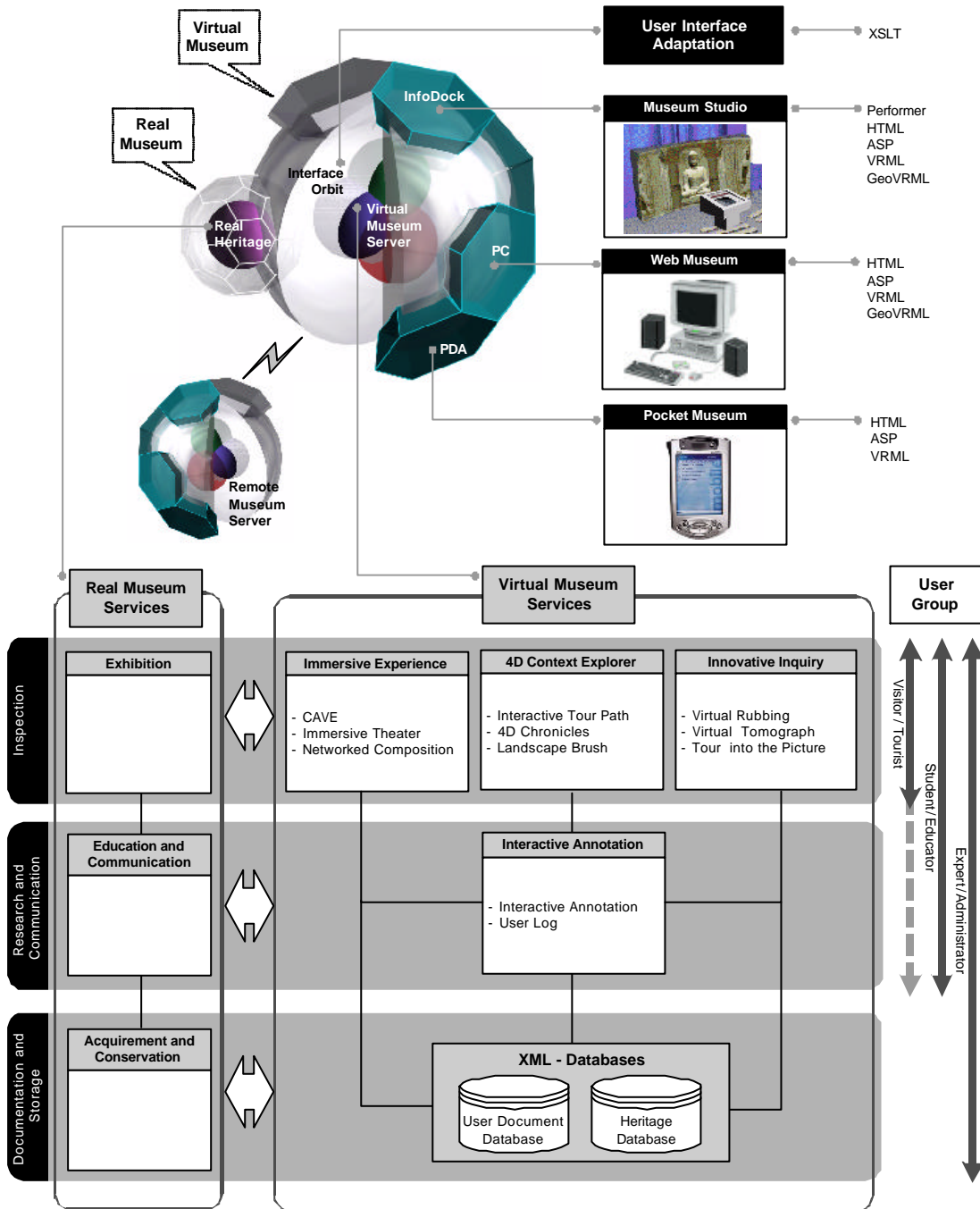
Figure 1 The structure of a virtual museum

3   User Interface Adaptation

3.1   Information Docking Station : Museum Studio:

Information Docking Station (InfoDock) is set in the museum studio which is equipped by Mixed Reality and Virtual Reality technology. InfoDock is composed of a touch screen and joystick controller. It not only provides virtual museum services by itself, but also controls equipments in the museum studio.

3.2   Personal Computer: Web-Museum:

A remote user can reach virtual museum services through internet with a personal computer (PC). Web-Museum offers museum services based on the three dimensional Web technology; VRML, GeoVRML.

3.3   PDA: Pocket-Museum

Wireless services are performed in a PDA device. Pocket-Museum can be applicable to both internet access and internal access in the real museum.

4   Virtual Museum Services

We investigated Virtual Museum Services focused on "Virtual Namsan".

4.1   Immersive Experience:

Immersive Experience consists of Immersive Theater, CAVE and Networked Composition. We use immersive space technology, mixed reality and chroma key technique. We also establish Storage Area Network (SAN) for this. From Immersive Experience service, a user can participate in immersive navigation of Namsan interactively.

(a)
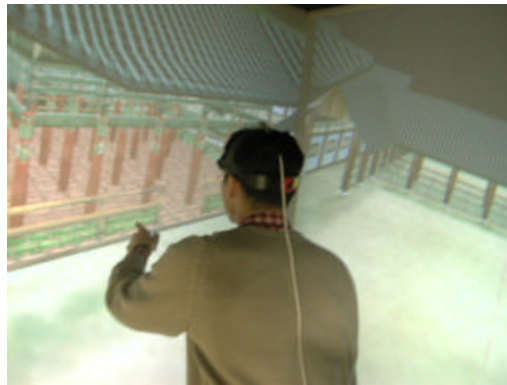
(b)

Figure 2 (a) Network Composition   (b) Immersive CAVE

4.2   4-dimensional Context Explorer

4-dimensional Context Explorer conveys investigating context of heritage in terms of both time and space. It includes Interactive Tour Path Selector, 4D Chronicle, Landscape Brush. We applied 3-dimensional GIS(Geographic Information System) technology for effective visualization. For flexible application, we adopt VRML and GeoVRML that are world-wide standards. Chronological and geographic data are selected from heritage database through Interactive Tour Path Selector and displayed on the 4D Chronicle, which suggests a novel method to navigate heritages. Through Landscape Brush, a user can feel different emotion of viewing due to some specific rendering techniques. In these services, a user can explore and browse Namsan's terrain with related heritages on it, also make a tour path in the various respects.
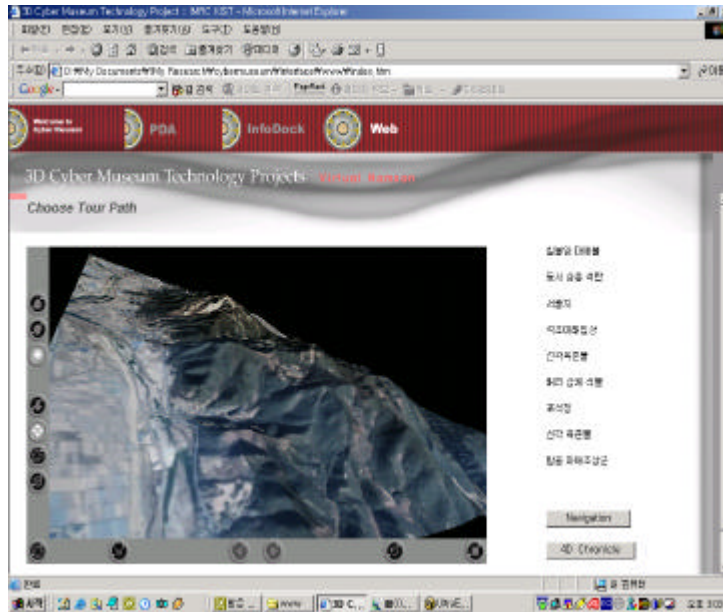
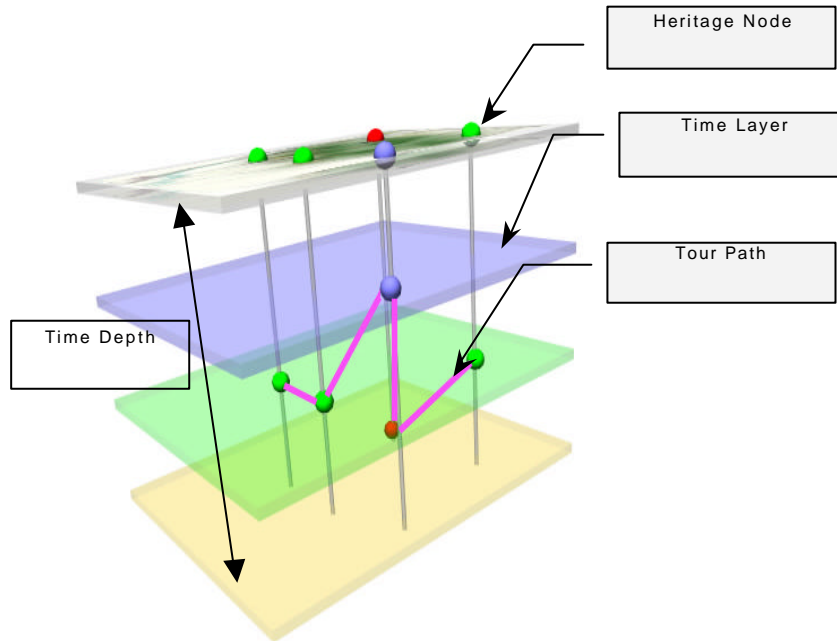**Figure 3 The interface of Web-Museum for Interactive Tour Path Selector**

Figure 4 The concept of 4D Chronicle

4.3 Innovative Inquiry

Innovative Inquiry is a meaningful approach to provide a unique service which is impossible in the real world. Virtual Rubbing, Virtual Tomograph and Tour into the Picture offer supplementary information and experience of the real heritage. We apply the Non-Photorealistic Rendering (NPR) and Tour Into the Picture (TIP) technology. A user can inquire the each heritage in Namsan.

4.4 Interactive Annotation

Interactive Annotation makes user to build a memento of a heritage and to communicate each other. When a logged-on user makes his/her own annotation, it is stored in the user document database. It is applicable between an educator and student for instruction.

5   Conclusions and Future Works

We investigated the virtual museum by constituting the concept of virtual museum with the reciprocal real museum. Based on the fundamental purpose and role of the museum, we suggested a model of a virtual museum composed by a virtual museum server and interface orbit. Through synchronized experiences between real and virtual museum, users can achieve thorough comprehension on the heritage.

This paper conveys the interim result of on-going research project, 3D cyber museum technology project. For the future works, based on the concept of the virtual museum, we are developing "Virtual Namsan" integrated with technologies mentioned in this paper. After developing, we can try to apply the other types of heritage contents.

Acknowledgement

References

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