



INTEGRATION OF VIRTUAL REALITY AND WEB-BASED APPLICATION IN DEVELOPMENT OF DIGITAL SONGKET MUSEUM

Bertalya¹, Prihandoko¹, Rakhma Oktavina² and Vega Valentine²

¹Faculty of Computer Science and Information Technology, Gunadarma University, Depok, Jawa Barat, Indonesia

²Faculty of Industrial Technology, Gunadarma University, Depok, Jawa Barat, Indonesia

ABSTRACT

This paper discusses about the further development of a digital museum of songket woven from Sumatra, which integrates the concept of web-based information technology with Virtual Reality. Development of this digital museum is following the spiral model of web-based software development stages consisting of formulation, planning, analysis, engineering, page generation and testing, and customer evaluation. Virtual Reality concept is used to present the digital museum to be natural.

Keywords: digital museum, songket, web-based application, virtual reality.

INTRODUCTION

Songket is one of the cultural heritages by the ancestors of Indonesia. The motifs and functions of songket have a very deep meaning [1]. The motif and philosophy contained in songket motifs not only about the environment and the relationship with the creator, but also about the traditions and culture brought by the traders who arrived to Indonesian territory [1]. It's influenced by the cultures of the Arabs, Chinese and Indian. The use of cotton thread was previously thrived by using gold and silver threads are carried by Chinese and Indian traders.

The government of Indonesia had developed some museums to preserve and to maintain songket [1, 2]. But, these museums had many limitations; for examples a limited space which could not accommodate all of the songket types. Besides that, the color of songket which were displayed in a display cabinet can fade and affect the overall songket motifs [1]. Styliani [3] said that information technology can overcome the problem of space in the physical museum as well as the problem of physical damage.

Along with the development of information technology, documenting the work of weaving songket can be done digitally as a digital museum that can store digital images of songket in large numbers. The process of digitizing a document object consists of the process of identification, transfer and modification done by the computer [4].

Digitization and representation of collections of museum objects in the internet media can expand the number of consumers searching for the cultural heritage objects. According to its functionality, a museum is positioned as a place to store, secure, save objects of cultural heritage, and to disseminate the cultural heritage to the public. For this objective, in the future, by using digital museum, a wide range of digital image songket can be stored safely and securely. Then, it can be used as a reference for a particular interest, such as for checking the originality of the songket motif and also the ownership.

The preliminary research of Bertalya, etc [1] had developed a prototype of digital museum to preserve this cultural heritage of songket. But, this prototype of digital

museum based on desktop and only identified Palembang's songket. Actually, these woven songket can be found in Aceh, North Sumatra, West Sumatra, South Sumatra, Bangka and Belitung Islands, East Nusa Tenggara, Kalimantan, Sulawesi, Maluku, Sulawesi, East Java, and Bali [5].

This research continues the development of a digital museum of songket woven from Sumatra, which integrates the concept of web-based information technology with Virtual Reality (VR). The web-based information technology is used to present all information of songket collections in a digital media and to allow the access from internet network, so that the visitors can view and learn about this heritage in a fast, user-friendly, and low cost interaction. VR concept aims to provide innovative display that can attract internet users to visit this digital museum and to put the visitor into a real-time simulation, acting in a world that can be both autonomous and responsive to its actions. Thus, it can make users interact with virtual worlds in the same way they interact with real worlds, so making the interaction task much more natural and reducing training [6].

In this paper, the use of virtual reality is intended to make the digital museum, which is a web-based system, to be natural. Thus, it is expected that the user will be interested in traveling in the digital museum as he/she is traveling in the real museum.

METHODS

The development of the digital museum follows the spiral model of web-based software development stages consisting of formulation, planning, analysis, engineering, page generation and testing, and customer evaluation [7]. This concept is then combined with multimedia technology that uses text, image, audio, and video in order to display songket aesthetically, interestingly, and attractively. Multimedia technology enables representation of museum collection objects not only displayed in the form of pictures or digital images but also be shown in the form of demonstrations, such as songket making process. The integration of multimedia elements in a vast communications network such as



internet, allows the collection and dissemination of information takes easier and more interesting for people [8].

The aspect of the presentation or the display of a digital museum is one of the most important aspects of the six dimensional aspects to evaluate the quality of an online museum [9]. In addition, some aspects need to be taken into account such as the dimensions of the Content, Usability, Interactivity and Feedback, E-Services, and Technical.

The requirements for virtual reality applications are defined by analyzing the needs in terms of input and output channels. The input channels of a virtual reality application are those with which humans interact with the environment. Interaction with the world mainly through locomotion and manipulation, and communication information mostly by means of voice, gestures, and facial expressions [10].

The sense of physical reality is a construction derived from the symbolic, geometric, and dynamic information directly presented to our senses [11]. The

output channels of a virtual reality application correspond thus to our senses: vision, touch and force perception, hearing, smell, taste. Sensory simulation is thus at the heart of virtual reality technology.

Vision is generally considered the most dominant sense, and there is evidence that human cognition is oriented around vision [12]. High quality visual representation is thus critical for virtual environments. The virtual digital museum mostly designed to accommodate the sense of user vision. Thus, the 'traveling' around the digital museum will be more natural as in the real museum.

In the analysis phase, identification process was conducted by visiting the center of craftsmen songket in Sumatera; Palembang, Lampung, Padang, Jambi, Riau, Bangka Belitung and textile museums. The songket motifs from these six regions have different names, but actually they describe about flowers, animals, nature, and geometric shapes. For examples, these motifs are shown in Figure-1 (a, b, c, d, e, f).



After that, the design of the website is developed. It contains multimedia object such as digital image, text, video and audio based on the identification of various traditional and modern songket motifs. In parallel, the design activity for architecture, navigation, and user interface is done technically.

The creation of the initial appearance of this digital museum is inspired by a traditional house in South Sumatra, called *Rumah Limas* [1]. *Rumah Limas* is a shelter where the roof resembles a pyramid (*Limas*) and rise, and stand on top of the pole, as shown in Figure-2.

The initial appearance of this digital museum is shown as if the visitors entering the traditional house as in



the real world. After entering the main hall, there are three doors in the left and three doors in the right which represent the six regions in Sumatra. This door will lead the viewer to see the sparkling and colorful display songket completed with an explanation of the name and philosophy of each motif.



Figure 2. Rumah Limas.

Rumah Limas in Figure-2 illustrates the Palembang culture that upholds customary norms prevailing in society. Spacious home form symbolizes the nature of togetherness in the form of mutual aid. Terraced house symbolizes prosperity.

The next process is the development of the homepages for each origin songket, integrating the images with the architectural design, navigation, and user interface.

Finally, the testing phase is done by executing the software internally to make sure that there is no error in the website. This is then followed by examining the application to a number of users to obtain the feeling of virtual reality aspect from the real users.

RESULTS

Figure-2 shows the initial appearance when a visitor entering the digital museum. Visitors are entering the door of a traditional house with a magnificent engraving on wood poles golden. Slowly, the door will open and the visitor will enter the main room of the museum as shown in Figure-3. In the middle of the room there is a picture of loom which is used for weaving songket cloth. On the left and right sides, there are six doors that will lead the visitors to see the exhibition songket from Palembang, Padang, Riau, Jambi, Bangka Belitung, and Lampung, as shown in Figures 4 and 5.

From the experiment carried out, it is found that the user got a new experience in interacting with the museum of songket woven from Sumatera. They can find the history of songket without going to the real museum.



Gambar 1. Bagian Depan Museum

a

Figure-2. In front of digital museum Digital.



Figure-3. Inside of digital museum.



Figure-4. The doors lead to the information of songket from Palembang, Padang, dan Riau.



Figure-5. The doors lead to the information of songket from Jambi, Bangka Belitung, dan Lampung.



Figure-6. The door to go to the opening page of Palembang songket exhibition.

If a visitor presses the text 'Songket Palembang' then it will show the songket image as the way to go to the opening page of Palembang songket exhibition, as illustrated in Figures 6 and 7.

All songket objects are represented in the beautiful images and explanation the name and philosophy of the motifs. One of the songket motifs with the name *Nampan Perak Kecil* is shown in Figure-8.

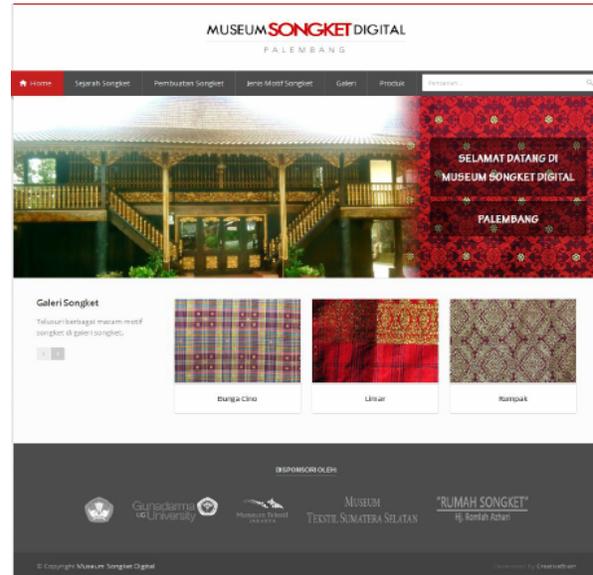


Figure-7. Frontpage of Digital Songket Museum of Palembang.

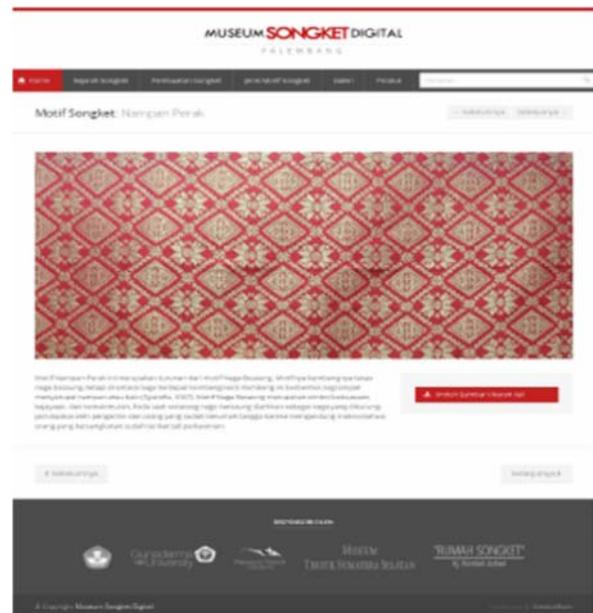


Figure-8. Motif of Songket *Nampan Perak Kecil*.

DISCUSSIONS

Pallas, etc [9] defined six evaluation dimensions of museum's web-site: 1) content, 2) presentation, 3) usability, 4) interactivity and feedback, 5) e-services, and 6) technical. Content is an important dimension. It includes all information about the object of the museum. It should be accurate, update and current. The second dimension is presentation. The presentation of the museum must show an attractive appearance with various multimedia and colors. The third dimension is dimension of usability refers to the easiness for visitors to access the



website. The fourth dimension is interactivity and feedback. It refers to the ability of the visitors to communicate with the other visitors to exchange information, news, opinions and suggestions. The fifth dimension is e-services which relate to the services such as calendar, highlights, statistics, e-books, e-shows, links to the other museums. The last dimension is technical which consists to four criteria: 1) availability and maintainability, 2) performance, 3) compatibility, and 4) security and privacy [9].

In the preliminary evaluation, we evaluate this digital songket museum by using two dimensions; content and presentation. As the content of this digital songket museum, it includes the image of the songket, the name of the motif, and the philosophy, as illustrated in Figure-8. In addition, there are history about the songket and the fabrication. But, because the language is still in Indonesia, as consequence the visitor with other languages could not enrich their knowledge about of songket.

The second dimension is presentation. The presentation of the museum must show an attractive appearance with various multimedia and colors [9]. To accommodate the sense of user vision, this digital museum is opening virtually, as illustrated in Figures 2 and 3. And, there is a short guideline to access to the homepage for each region, as illustrated in Figures 4, 5 and 6.

The third dimension is the usability of the system. As illustrated above, the use of virtual museum with the ease of use will attract the attention of users to use it. The use of user friendly GUI will increase the usability of the system.

The fourth dimension is the interactivity and feedback. Because the user is able to decide "what to do" and "where to go" interactively, this digital museum is giving the user an interactive communication with the system.

The fifth dimension is about e-service. This parameter is still very new. Basically, this digital museum is really an electronic and online version of the real museum. At this point, the online service to the user can be stated as e-service.

The last dimension is about technical aspect. According to the IT expert, this technical aspect of the system is not complicated. The main issue is the completeness of the pictures and the sentences following them.

By evaluating the system according to six dimensions above, it is found that the system is really needed by people who want to know about songket, and the same time to improve the knowledge. This is also triggering the other researches to elaborate the richness of the heritage of Indonesia.

CONCLUSIONS

The development of a digital museum songket from six regions in Sumatra presence enriches the existing textile museum in some areas as well as in the center of the capital Jakarta. In accordance with its vision, the museum is not only documenting digital objects songket but also promoting to the public about one of the cultural

heritage in Indonesia. Presentation of the songket with attractive display and detailed information will inspire visitors from Indonesia and the world to come to the real textile museum, thus they can feel deeply the beauty and the grandeur of songket. The collectors can collect different types of songket and enrich knowledge about various motifs of songket.

ACKNOWLEDGEMENT

The authors would like to acknowledge the financial support from Direktorat Penelitian dan Pengabdian Kepada Masyarakat, Directorate General of Higher Education (DIKTI), Ministry of Education and Culture, Republic of Indonesia in 2013 and 2014. We are grateful also to Danu Satria Ramadhan, Riyanto Wibowo, Muhammad Reza and Lilis Setyowati which have supported the development of digital songket museum.

REFERENCES

- [1] Bertalya Prihandoko, Rakhma Oktavina, Danu Satria Ramadhan. 2014. Designing a Prototype of Digital Museum to Promote Woven Songket, a Local Product of Sumatera, Indonesia. *Jurnal Teknologi Universiti Teknologi Malaysia*. 68: 3(2014) 77-80, www.jurnalteknologi.utm.my, eISSN. 2180-3722.
- [2] Tanudirjo D.A. 1995. Theoretical Trend in Indonesia Archaeology. In P. Ucko (ed), *Theory in Archaeology, a World Perspective*, London: Routledge. pp. 61-75.
- [3] Styliani Sylaiou, Fotis Liarokapis, Kostas Kotsakis, Petros Patias. 2009. Virtual Museums, A Survey and Some Issues for Consideration. *Journal of Cultural Heritage* 10. Elsevier.
- [4] Tang Muh-Chyun. 2005. Representational Practices in Digital Museums: A Case Study of the National Digital Museum Project of Taiwan. *The International Information and Library Review*. 37. Elsevier
- [5] Wacik Jero. Katiwa Suwati and Hermanto Unggul. 2010. *Tenun Ikat. Indonesia's Ikat Weaving Traditions*. Kementerian Kebudayaan dan Kepariwisata, Republik Indonesia.
- [6] Gobbetti Enrico and Riccardo Scateni. *Virtual Reality: Past, Present, and Future*. CRS4 Center for Advanced Studies, Research and Development in Sardinia Cagliari, Italy. CRS4, Via N. Sauro 10, 09123 Cagliari, Italy, <http://www.crs4.it>
- [7] Pressman Roger S. 2001. *Software Engineering: A Practitioner's Approach* 5th ed, McGraw-Hill Companies.
- [8] Schweibenz Werner. 1999. *The Learning Museum: How Museums use Information Technology to present value-added Collection Information for Lifelong*



Learning. Proceedings of the 7th International BOBCATSSS Symposium Learning Society - Learning Organisation - Lifelong Learning, Bratislava, Slovak Republic.

- [9] Pallas J. and Economides A. A. 2008. Evaluation of Art Museums' Web Sites Worldwide". Information Services and Use. 28(1): 45-57, IOS Press. ISSN: 0167-5265, E-ISSN: 1875-8789.
- [10] Balaguer J.-F. and Mangili. 1992. A. Virtual environments. In New Trends in Animation and Visualization, D. Thalmann and N. Magnenat-Thalmann, Eds. Wiley, New York, NY, USA.
- [11] Carr K. and England R. 1996. Eds. Simulated and Virtual Realities. Taylor and Francis, 1996, ch. Virtual Environments and Environmental Instruments.
- [12] Kosslyn. 1994. S. Image and Brain: The resolution of the imagery debate. MIT Press, Cambridge, MA, USA.