Possibility of Virtual Reality in Actuality Formation in Customer Experience: Case Study on the Invisible World Heritage the Mietsu Navy Remnant Site

Hiroshi Koga and Sachiko Yanagihara

Abstract—In recent years, the concept of smart tourism has attracted attention. It is an approach to create new attractions by using the latest ICT in sightseeing spots. And, needless to say, the key to smart tourism is cutting-edge ICT. However, state-of-the-art technology does not realize smart tourism. Rather, we would like to insist that the important success factor in the realization of smart tourism is the fact that the reality supported by McConnell's "authenticity" is indispensable. Therefore, in this paper, we rely on "experience economy" advocated by Pine and Korn (1999), and consider the issues of smart tourism. In other words, the purpose of this paper is to conduct preliminary consideration on the significance of actuality and/or reality in smart tourism.

For that purpose, I will introduce the case of Japanese world heritage: VR utilization in Mietsu Naval remnant site/三重津海軍所跡，UNESCO World Heritage Site as "the Industrial Revolution Heritage of Meiji Japan". Then, we would like to clarify the challenges and success factors of smart tourism from open date/disclosure of data and experiences of field studies (visited on January 16, 2016). In the other words, we will clarify the current situation and challenges of customer experience by VR through the case of the Mietsu Navy site.

Index Terms—Smart tourism, virtual reality, actuality, customer experience.

I. INTRODUCTION

The purpose of this paper is to conduct preliminary considerations to examine issues of smart tourism. The purpose of this paper is to conduct preliminary considerations to examine issues of smart tourism. Smart tourism is the boundary or convergence of information system research and tourism research. Therefore, methodological diversity of research approaches is required. However, whether it is tourism research or information system research, many conventional researches tend to be oriented towards objective research that follows the natural sciences. It has adopted a third-party perspective rather than a tourist's position. Surely, natural science can be pointed out as "the science of the third person" that objectively describes the state and properties of "matter" (cf. [1]). On the other hand, tourism research subjects are human and information system research targets at "artifacts". In addition, in the latter the interests of research are related to the design and operations of the artifacts which can achieve desirable functions. For that reason, it is important for us to commit ourselves to and intervene in the practice of an artifact rather than the description of the artifact. Therefore, it is said that we would have to depend on a scientific view different from natural science [2].

In other words, the new scientific view is a new view of knowledge. The knowledge related to information systems is regarded as different from the objective knowledge for which natural science may seek. The writer thinks that the characteristics are the knowledge related to practice, the knowledge inherent in the relationship between individual information systems and their users and the personal knowledge mentioned from field viewpoints of these users.

The author thinks it a useful direction that we pursue the knowledge mentioned from "a viewpoint of the first person" to consider the information system research, specifically, the interaction between human beings and computers [3]. In this respect, it would be important for us to point out the significance of "First person research" from the acknowledgement which only the research methods that regard objectivity as the first principle and seek for universality are insufficient even in the Japanese Society for Artificial Intelligence [4].

We can elucidate such a difference of knowledge views through quoting two words expressing a sense of real, concepts of reality and actuality. As is well known, reality derived from res which means "thing" has a different sense of real from actuality which etymologically originates from "action". Therefore, we would introduce the concept of "reality" and "actuality". we can distinguish between reality and actuality in that actuality has a position related to the very functions of an action which works on the existing things while reality has a position which acknowledges and confirms things composed of the existing things ([5], pp. 12-13). Thus, we can understand reality as the presence of the objective world and actuality as the presence related to human experience created by specific physical actions.

Therefore, in this paper, we would like to argue about the importance of human experience to achieve actuality through an example in Japan. In this paper, we would like to examine the interaction between human and machine (particularly, the technology of virtual reality: VR) with the clue of two concepts, reality and actuality.

Especially, we will argue about the importance of human experience to achieve actuality through an example in Japan (the VR use for the World Cultural Heritage of UNESCO). The selected example is the Mietsu Naval Facility/三重津海

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軍所 (dock, scholl and office) in Saga prefecture, Japan, which was registered in the World Cultural Heritage of UNESCO as "a heritage of Japan's Meiji Industrial Revolution" in 2015. Of course, it is not a registration alone. It's one of the heritage groups that dot 8 prefectures (Yamaguchi, Fukuoka, Saga, Nagasaki, Kumamoto, Kagoshima, Iwate and Shizuoka). Some of the heritage became famous as Japan's first extant running to heritage. However, the Mietsu Naval Facility does not exist any more. Consequently, the Mietsu become famous as a heritage which is invisible (in Japanese, it is called "mienai/見えない." Pronunciation is truly underlined with the name Mietsu.). There is nothing to watch even if tourists visit the Mietsu site. Therefore, this site provides a high reality in tourist using the virtual reality technology.

Then, as a methodology, case studies are used. We conducted case studies based on published information such as newspapers and magazines, public information of municipalities and the experience of the author's inspection (January 16, 2016).

II. CASE: MIETSU NAVY REMNANT SITE

A. Background of UNESCO World Heritage Listing

In this section, we will explain the first overview. By the way, research methods that we have adopted is the case study. It is based on impressions that we have experienced and public information.

It is located at the mouth of the Hayatsue River/早津江川, which is a tributary of the Chikugo River/筑後川 that flows through the boundary between Saga Prefecture/佐賀県 and Fukuoka Prefecture/福岡県. Currently, it is "open field" as shown in Fig. 1. Even if you visit a land with a registered area of 3.14 ha, there is only "an empty lot."

Fig. 1. The Appearance of Mietu Navy remnant site (photograph taken by authors).

In the Edo/江戸 period, Mietsu was a place which the Saga Domain/佐賀藩 had managed its ships. A training school which would teach knowledge and techniques related to operations of western-style ships was established in 1958. It was functioned as a naval base which might provide facilities such as a public office, naval education and manufacture and repair of western-style ships in 1861. It is also famous that Ryoufu-maru/凌風丸, the first domestic steamship has been built. Then, it has finished its mission due to the establishment of prefectures in place of feudal domains.

Later in the excavational investigation in recent years, the Navy facility of Miejitsu turned out to be the oldest dry dock existing in Japan, and was certified as a "national (that is, Japanese) historic site" in 2005. However, the recognition of national historic sites is not directly linked to the registration of UNESCO World Heritage List. The background that the site was registered as a world heritage is complicated.

Initially, Miejin was not the subject of the World Heritage List. In fact, in November 2006, Saga Prefecture itself was not included at the stage of the provisional list of "Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding and Coal Mining." By the way, this list uses a system called "serial nomination". It is a method aiming at registration of the World Heritage by integrating the heritage group that is hard to be recognized as a World Heritage by itself. In the other words, it is a system that seeks to register as a World Heritage Site as a whole structure composed of multiple asset groups.

In January 2009, a provisional list was announced that expanded its constituent assets with the intention of serial nomination. There, from The Saga Prefecture, the former Takatori Family Residence/旧高取家住宅 in Karatsu City/唐津市 (Built in 1904, home of the king of the coal-mining industry/炭鉱王, Koreyoshi Takatori/高取是好) was added to the list. However, even at this stage, Mietsu was not on the list.

However, in October 2009, the former Takatori Family Residence was rejected from the committee of experts. Then, at length, Mietsu Navy remnant site was become a candidate for the list. The task as an additional candidate is said to be proof of universality, truthfulness, completeness of shipbuilding facilities and the like. For that purpose, an excavational investigation was conducted by the Saga City Board of Education in a hurry. The investigation was continuously developed from 2009 to 2014. As a result, the remains of naval site such as the oldest dry dog in Japan appeared (existing was confirmed).

However, such wooden docks were also difficult to maintain state unless they touched the groundwater, and it turned out that deterioration progressed when they touched the air. For that reason, in order to preserve and preserve the remains, there was no choice but to "backfill." Then, the Mietsu Naval site was restored to the original state, that is, "an open field." It is the birth of invisible historic sites.

For the 2013 recommendation for UNESCO World Heritage registration, the asset group was reexamined, all the properties of Shimonoseki city, Yamaguchi Prefecture/山口県下関市 were rejected, and the Nirayama Reflection Reactor/韮山反射炉 of Izu City, Shizuoka prefecture/静岡県伊豆市 was added. It is the result of emphasis on the story as serial nomination. Fortunately, the Mieitsu naval site remained on the list. Thus, in 2015, the Mietsu Naval site was registered as a UNESCO World Cultural Heritage as one of the 23 constituent assets of the Industrial Revolution Heritage (Steel, Steel, Shipbuilding, Coal Industry) in Meiji Japan. However, among the constituent assets group, it was the only "world heritage not found on the ground."

Currently, in Tunetami Sano/佐野常民 Memorial Museum, which opened nearby, various exhibition and videos gives detail explanations of the Mietsu Naval Docks. Here, for Sano, we will introduce the description of the web site [6]. Tsunetami Sano was one of the "Saga no Shichi Kenjin/佐賀の七賢人" (seven intellects of Saga) and, from the end of the Edo Period until the Meiji/明治 Period, played

a pioneering role in many fields, including politics, science and art. In particular, Sano/佐野 is famous for establishing the Philanthropic Society (present day Red Cross Society of Japan) during the Seinan War/西南戦争, and is today referred to as the "Father of Japan's Red Cross Society". Further, Tunetami Sano had been involved in shipbuilding (Ryoufu-maru, as mention above) in Mietsu.

By the way, Tunetami Sano Memorial Museum was opened in 1973. When it was opened, Memorial Museum had been annexed to "Naka-Kawa-Soe community centre /中川副公民館." Then, it was moved to the present location in October 2004. At the time, the area of Mietsu Navy Facility Heritage has been developed as a "Historical Park". Next December 2005, Sano Memorial and Historical Park that is combined Sano Memorial Museum and Historical Park has been completed. The remnant is currently being backfilled for preservation, so it is impossible to take a look at the real thing directly. Thus, people can learn the size and structure by the full-size panel, model, video, etc. displayed on the 3rd floor of the Memorial Museum.said, to insert images in Word, position the cursor at the insertion point and either use Insert | Picture | From File or copy the image to the Windows clipboard and then Edit | Paste Special | Picture (with "Float over text" unchecked).

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B. An Inestimable Marketing Strategy of Mietsu Naval Site

Then, as mentioned above, we cannot directly see the remnants even if we visit the site which has the registered area of 3.14 hectares because the world heritage, a building built 160 years ago, was buried under the ground of the coast. It is currently buried back for conservation [7]. Therefore, it is operating public relations activities through setting a masochistic catch phrase "an invisible world heritage, Mietsu" with the pun of a Japanese word "mienai" which means invisible. It is Saga (city promotion office) that has proposed such a sales copy -- that is, "an invisible world heritage, Mietsu/見えない世界遺産三重津" (cf. [8], [9], Fig. 1).

Further, the Saga City Promotion Office has opened a channel on "YouTube" that is a video-sharing site. From September 25, 2015, they have published the video. Video is five in total [10]. In addition, they founded the web site for campaign of "an invisible world heritage, Mietsu."

Fig. 2. Screenshot of Saga City website [11].

Now, not only are the archaeological finds from Naval Dock exhibited in Tunetami Sano Memorial Museum

adjacent to it but also the experiential tours of Naval Dock using VR are offered. Such activity is referred to as "time cruising." In the leaflet of it's, the tour has been introduced in the follows. That is, "Soon, you'll see what the Facility looked like in those days. Please take time to enjoy"hands-on" experience full if new surprises, aided by computer graphics". Specifically, they are indoor "Time Travelers" and outdoor "Mietsu Walker".

In the former, people can experience the image video of Naval Dock in those days through using the head mounted display invented by Oculus Company and called Rift and the image output system for VR. Then, time travel is introduced as follows: In an instant, you transported back through time and space to the Mietsu Naval Dock in the late Edo period [12]. Fig. 3 is photograph showing the state of the use and appearance of the Time Travelers.

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Fig. 3. The appearance of "Time Traveler" (photograph taken by authors).

The latter is a tour that people may walk on the historical site with an offered map and a VR equipment, "Mietsu SCOPE" or "VR SCOPE." (Fig. 4).

Fig. 4. The appearance of "VR SCOPE" (Photograph taken by authors)

A device which checks points can loom up on the map when the sunlight shines on it is offered. If they peek into the VR SCOPE in individual spots, they may watch the appeared panoramic video which images Naval Facility in those days with voice guidance. Thus, it tries to make the invisible world heritage visible by providing people with the video full of presence. Mietsu Walking is introduced as follows: With map in hand, earphone in one year, and the VR SCOPE around your neck, it's time to set off for the Mietsu Naval Facility Site! Head for the Sightseeing Point while listening to the audio guidance (see Fig. 5). Take a look through the VR SCOPE, and you'll see a panoramic image of Mietsu Naval Dock as it was about 160 years ago. The image that can be seen on the VR scope is shown in Fig. 6

Fig. 5. The appearances of "Mietsu Walker" and VR SCOPE (Photograph taken by authors).

Fig. 6. The VR scope image (http://mietsu-sekaiisan.jp/vr_scope/ [left], https://expo.saga-hizen150.com/en/venue/mietsu/ [right]).

After the recommendation by ICOMOS (International Council on Monuments and Sites), that is, May 4, visitors of Mietsu Naval Dock site and Tunetami Sano Memorial Museum had rapidly increased. In this paper, we understand the visitor as tourists. And we define tourists as follows; people who do not do business while traveling (cf. Tourism Satellite Account [13]).

Before the recommendation, the average number of visitors per day was 130 people. However, 1600 people visit there on the next day of recommendation (May 5), and 2,050 people was recorded on two days later of the recommendation (May 6). Then, museum office was coped with by opening the closing date (Monday except holidays). Then, the number of visitors are 3,738 (April), 19,086(May), 10,027 (June), 20,149 (July), 19,708 (August) people (City Council Minutes: August regular meeting years 27, September 11 issue -03). Visitors total number of five months of April to August is about 72,000 people. This number is already about twice the last year of annual visitor total about 38,000 people [14]-[18].

According the newspaper article, users of VR SCOPE feel admiration for high reality and someone who use it said "I could understand that the old days of state has been found" [19]. When those services started, the number of prepared SCOPE was 40. However, they were fully operational state. The day after the recommendation, the number of users is 362 people. And two days later, 465 people use the VR SCOPE. On the day that many visitors use the VR SCOPE, the service office paused a rental for the charge of it.

However, as the visitor (tourists and traveller) is increased, some of the challenges has become clear. About the challenges, we want to consider in the next section.

III. DISCUSSION: IMPACT OF VR

A. Reality v. Actuality

The history of research on utilization of virtual reality in tourism is not very new. Early studies can be traced back to 1995 (cf. [20], [21]). However, in there, the possibility of the technology has been discussed mainly For example, discussions such as sightseeing while staying at home, helping to protect ruins, etc. have been done. In other words,

there are advantages for study the study and conservation of heritage.

As a result, tourism experience in the virtual space was a keyword. For example, Guttenta [22] claims "planning and management, marketing, entertainment, education, accessibility, and heritage preservation are six areas of tourism in which VR may prove particularly."

Furthermore, in recent years, combined use of VR "at sightseeing spots" has become a focus of attention. That is, it is a smart tourism. Research keywords were replaced by "tourist experiences." It can be said that the weight of education and entertainment such as immersion experience and additional information in sightseeing spots has increased (cf. see [23], [24]).

However, in this case, there is a strong tendency to emphasize the technical aspect, and there seems to be little discussion about customer experience. In fact, it is said that there are many satisfied tourists in VR. At 27 December 2015, NHK (Nihon Housou Kyoukai/日本放送協会: that means "Japanese Broadcasting Corporation") were reporting the news, such as the following. That is, the result of the questionnaire survey Saga City was carried out has revealed that nearly 70% people have a high evaluation. After all, it could be said that it was satisfying feeling by experiencing VR (for the first time). This is clear when we look at the voice of users on the Website (http://mietsu-sekaiisan.jp/oculus/; where, the comment field could not be currently accessed). There is no content saying "I have thought of the old days by seeing the World Heritage site." There are only impressions of "Experience with VR scope."

Of course, besides the comments of technology praise, there are also complaints about technology attitude. Because, smart tourism is not a silver bullet. In the case of smart tourism, new and unintended problems arise. Generally, it is said that new and unintended problems will become apparent through the operation. Then, it is said that the problem of smart tourism, especially tourism using tourist spots in virtual reality, cannot build human relationships in the real world, but instead is completely immersed in the simulated environment [25].

In fact, it is said that there are many opinions that want to see the real thing [7], [26]. Further, there are some people that surprised to visit without knowing that it is not seen real heritage [7]. Then, in 26 November 2015, as the location and size of the remains can be seen from the ground, actual size photograph of a panel of the remains have been placed on the ground by the city [27].

In addition, at saga city council, for realizing and clarifying the image of naval facility, it was proposed the need for reconstruction possible aboard "Ryoufu-maru/凌風丸" [20]. However, that was an unfeasible proposal. Construction of a new structure could not be permitted as maintenance of the present condition is a condition of a world heritage. Incidentally, the ship has been installed in the memorial park once, but it was as a play equipment. Then, in response to the recommendation of UNESCO, it has been removed. Because, the playground equipment is not suitable as a World Heritage Site.

In this way, due to restrictions on maintenance due to World Heritage Sites, several measures have been studied to compensate for "dissatisfaction" of historic sites [28].

Furthermore, when rushing CG production, it became clear that research in that period was inadequate [29].

Keywords of this case are "reality" and "actuality" of the above. We would like to repeatedly emphasized that "reality as the presence of the objective world" and "actuality as the presence related to human experience created by specific physical actions". And we understand that the sense of real is supported by two of the concept. From this point of view, if actuality is weak, people will feel low reality to immediate events. Moreover, if actuality is too strong, people will get a feeling of "déjà vu" even for real for the first-time experience.

In this case, the tourists in charge of it are considered to be those who would like to enjoy the world outside the ordinary environment. In other words, the tourists would not like to pursue and experience a reality but they seek for the experience of the sense through spending time on the spot and the consumption of actuality. If so, it will need to consider the actuality without pursuing the reality.

However, a sense of reality by virtual space is the pursuit for reality. Rather, if many tourists want the significance to experience the industrial remnants or the actuality, it will need to provide people with something else but a sense of reality provided by VR. Nevertheless, we have no choice to mention that the VR and exhibition contents at the present stage are not in the level that can sufficiently experience the actuality which witnesses an industrial heritage that has supported Japan's Industrial Revolution. Of course, if the tourists positively commit themselves to the industrial heritage, they may enjoy the experience filled with a sense of reality. However, it may be too severe to ask the tourists to have the background knowledge.

B. Possibilities of VR: From a Viewpoint of Experience Economy

Next, consider the possibilities of cases from the viewpoint of Experience economy.

Then, Pine and Gilmore [30] point out that "by simply appealing only the functions and efficiencies of goods and services, it will become commoditized and eventually become difficult to differentiate." And to avoid commoditization, they argue that it is indispensable to provide "experiences engraved in the customer's mind."

Further, Pine and Korn [31] focus on the place where experiential value (eventually "transformation", in their term) is exposed, and categorize it into 8 areas using three dichotomies; (1) time v. no-time (actual v. autonomous, (2) space v. no-space (real v. virtual), (3) matter v. no-matter (atom v. bits). They propose a type as shown in Table I from the substance axis having both poles (see, Table I).

TABLE I: THE EIGHT REALMS OF THE MULTIUNIVERSE

#	Variables			Realm
1	Time	Space	Matter	Reality
2	Time	Space	No-Matter	Augmented Reality
3	Time	No-Space	Matter	Physical Virtuality
4	Time	No-Space	No-Matter	Mirrored Virtuality
5	No-Time	Space	Matter	Warped Virtuality
6	No-Time	Space	No-Matter	Alternate reality
7	No-Time	No-Space	Matter	Augmented virtuality
8	No-Time	No-Space	No-Matter	Virtuality

(source: Pine and Korn [31], p.17)

In addition, Pine and Korn argue that if it can decide one starting point or an area to be an anchor, it should proceed to the next stage ([31], pp. 157-167). That means adding a new area's experience by shifting one dimension. For example, if the base point is "reality," there are three areas to go. Move the time axis and go to "Warped Virtuality," shifts the space axis and proceeds to "Physical Virtuality," alternatively, shift the substance axis to "Augmented Reality." Proceed to one of these. Furthermore, by shifting the other axis, the third new area is added. Ultimately, by proceeding to the opposite polarity of all dimensions, that is "Virtuality," an excellent experience (transformation) can be realized. Moreover, deepening of experience does not end there. Furthermore, it is argued that by going back to the starting point, it will be able to provide even more profound experience.

In the case of Mietsu, the starting point is equivalent to the area of "Alternate Reality," because the world of CG images transcending time in the actual place plays the central role.

The feature of "Alternate Reality" is the intersection of the current space and the virtual space time. Then, Pine and Korn state as follows; Creating an alternative view of the real world, Alternate Reality uses Reality as a digital playground via a superimposed, virtual narrative feed from the bonds of actual time ([31], p. 154).

Therefore, it is important not only to show the state of the naval office at the time, but also to construct a mechanism that can realize the relevance to "now and here." Furthermore, in the future, it is important as a next stage to incorporate "Virtuality" which shifts the dimension of space, or "Augmented Reality" which shifts the dimension of time. Of course, theoretically, "Warped Virtuality" which shifts the dimension of places is also an option, but if you are supposed to visit, this option will not be realistic because you need to stick to places. According to the argument of Pine and Korn, eventually, when advancing to the "Physical Virtuality" which is the true opposite region of the "Alternate Reality," and from there to feedback to the "Alternate Reality," "Actuality (not reality)" could be provided. But the road is far away. First of all, it will be a future task to develop into the Realm of "Virtuality" or "Augmented Reality."

IV. CONCLUSION

In recent years, people focus on a serious game which allows them to simulative experience such scenes as disaster relief. The time and space achieved there have not only programmed realities but also the aspect of actuality supported by the planners' sense of purpose and their personal ambitions. It is not until the planners can build their own independent space (the space extended from their bodies) in an objective environment different from daily life that they can make reality coexist with actuality. However, it may be difficult to expect the tourists to have such a definite sense of purpose and an incentive to learn. In other words, I conclude that it is difficult to create "a sense of reality just like what they have done there" just by ICT without showing the tourists the methodology which should be called industrial archaeology.

In the case of Mietsu, information was provided by virtual reality at sightseeing spots where the remains cannot be seen. Specifically, Time Traveler is oriented toward immersive experiences and Mietsu Walker which provides presence.

The former provides sufficient immersive experiences, although there is a problem of era verification. Therefore, as mentioned above, we cannot deny weak in the construction of human relations in the real world. Thus, from the experience of the author, the relationship between these two virtual reality services is a little confusing. However, more important problems are the following.

It seems that the actuality that sightseeing the site of the industrial remains, which is the reason for the registration of World Heritage, is not enough. It seems that the actuality that sightseeing the site of the industrial remains, which is the reason for the registration of World Heritage, is not enough. What kind of things cannot be experienced without traveling to the site? If it is said that it is a virtual reality service, it is very disappointing. The reality provided by the virtual reality of this case is not "authenticity" claimed by McCannel [32].

The author would feel that I need something to experience with virtual reality service. In this paper, we call such a factor not as a reality but as an actuality. Reality is provided by virtual reality. However, actuality is a sensation accompanied by the feeling that it is promoting commitment by tourists, and now is staying here in tourist spots. In order to provide such a sense, it will be necessary to conduct first-person research as a tourist rather than objective third person's research.

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