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Online to Onsite: A Case Study of Information System for Capturing Museum Visits

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ABSTRACT: The National Science and Technology Museum creates an "Online to Onsite visitor behavior system"(OOVBS) into "Explore IoT Exhibition". The system is installed in all interactive units, through app, beacon technology and program for capturing personal experience during a museum visit. Besides, we adopted Stephen Bitgood's behavior observation scale: the degree of involvement, the state of operations, the degree of reading, and the content of discussion into this interactive unit as criteria for evaluation. We will be able to retrieve visitors' data that included basic information, comments and feedback, as well as comprehensive performance of visitor behavior via this system, by starting and operating interactive units with the corresponding identifiers of the applications demonstrated at the exhibition that they download. This article presents an "online to onsite" exhibition mode of intelligent museum to access learning behavior of visitors and build data analysis.Through the actual implementation of a visitor database for the exhibition, audiences' visiting behavior and learning mode can be documented and evaluated. If the concept of a 'museum group' system can be developed in the future to integrate all museum audiences' information, it will have an impact on the museum's exhibitions, education, and operations.

KEYWORDS: Internet of Things (IoT), Beacon, Museum exhibition.

1 INTRODUCTION

In recent years, with the development of IoT and its related technologies, industries, the service industry in particular, have growing demand for interior positioning technology. With this trend comes the evolution of various services in museums from "informatization" to "intellectualization." In her article "When the Art Is Watching You," Ellen Gamerman (2014) [1]explored U.S. museums' attempt of using beacon in exhibitions to capture visitors' behavioral data to analyze audience behavior. With the transition of the purpose of holding exhibitions, the act of simply displaying exhibits is no longer what designers seek. Instead, serving the audience is slowly becoming the core value of exhibitions. Therefore, doing evaluation research on audience behavior has gradually become an important basis for museums in terms of raising exhibition service quality and formulating development strategy.

Using beacon as a medium to collect user information to accurately record the duration the audience is at each area of the exhibition and their actual audience behavior during the viewing process, the information can truthfully reflect the audience's actual feelings, which conveniences the exhibitors in formulating more concrete evaluation and analysis of some deep-level details. This form of audience research will be more convenient and effective than traditional methods. Moreover, traditional audience behavior observation only randomly selects individual audiences or a small group of audience. This random evaluation method will generate great error and does not ensure the stability and accuracy of information. Through collecting audience data via beacon, compared to random data, this full-sample data can more accurately evaluate audience behavior and be integrated with a recommendation system, which will recommend the audience with exhibitions and events they might like based on behaviors including browsing, searching, preferences, etc[2].

This article takes the National Science and Technology Museum's (NSTM) Explore IoT Exhibition (the Exhibition) as the actual field of design, with an attempt to construct an audience-centered intelligent exhibition mode, to evaluate audience behavior. This Online to Onsite visitor behavior system (OOVBS) has beacon micro positioning perceptive technology as a foundation, and uses information technology, mobile devices, human-computer interaction applications, etc., paired with physical interactive units in the Exhibition, to track audiences' viewing tracks and further record their cognition, understanding, demand, and learning pattern of the exhibits to establish the learning records for attending the exhibition. Then, based on user involvement and operating behavior, the system sorts out whether the display method and content of the exhibits are appropriate and further analyzes them for improvement with the hopes of constructing a good and useful Online to Onsite exhibition design pattern. At the same time, it hopes to establish an interactive platform between the museum and visitors via an information response system so as to achieve instant communication between visitors and the museum.

2 Research Purpose

From evaluating audience behavior to designing exhibitions to marketing strategies, big data analysis is changing various levels of museum management around the world. The Met[1] attempted to capture all visitors' behavioral data by setting extensive beacon in the exhibition hall, for example, how long you were in the museum, judging your likes and dislikes of exhibits based on how long you stay at a place, whether you went to the souvenir store, etc. The information all go into the database in order to provide the visiting audience with more personalized experiences. The Norman Rockwell Museum of Massachusetts, U.S.[2] even gained more substantial revenue growth from the big data. From the big data, they analyzed visitors' various behavior patterns and applied them in their souvenir stores, greatly increasing its income. They also applied the patterns to the precise marketing of different exhibitions, raising their annual customer flow. The Dallas Museum of Art in Texas, U.S.[3] implemented a frequent customer plan which uses exchanging goodies with information to encourage visitors that want to get the rewards to willingly keep coming back to the art museum.

France's Musée du Louvre[4] [3]fully makes use of mobile clients to execute real-time guide of the attractions within the museum to help visitors get to their destination quickly. The Shanghai Natural History Museum[5] established a collection big data and audience behavior data to understand what the audience is interested in, how long they've stayed, and analyze their tracks. The above are all examples of using big data to gain further enhancement. To sum up the aforementioned, it is not hard to see that "intellectualization" management has become an important direction of development in the improvement of museum services. Sine the imagination, change, impact, and effects of the future of the digital age is truly unpredictable, knowing how to provide the audience with custom-made museum services and furthermore reach precise marketing, vast fundamental research and data collection are bound to happen. New-generation museums cannot neglect the formidable force of technology and development opportunities. What kind of a future do we face? One that's constantly changing and unpredictable. We might not be able to "update" right away, but we have to "keep up."

3 Documentation Analysis

3.1 The Application of Beacon

Beacon is a near-field perceptive technology of low-power consumption Bluetooth technology. It can also be called the "lighthouse." In the system, applications running within smartphones, tablets, wearable technology, or other calculating equipment can respond to the signals given out by the beacon. The beacon is a small and inexpensive physical equipment which can be placed by users at a certain place to send messages to "response equipment" within a certain distance[4]. Simply put, beacon is like a lighthouse that continues to broadcast signals. When a cell phone enters the "irradiation" area of the "lighthouse," the beacon will send a code to the cell phone. When the code is detected by the application in the phone, a series of actions will be initiated. The actions may include downloading information from the cloud or starting other applications or linkage devices. It mainly focuses on the use of push notifications for retail consumers in order to bring in promotional business opportunities. The third largest supermarket in the U.S., TARGET, uses beacon technology to fulfill the positioning service in the supermarket. Users only have to use the Target App to update their shopping lists beforehand. Once they arrive at the supermarket, the application will show a map for guided purchase, with the location of every product on the shopping list

[1] Ellen Gamerman's Dec. 11th, 2014 "When the Art Is Watching You."
[2] Same as above.
[3] Same as above.
[4] Cited from Wei Hsia's 2015 translation compilation, "The Excursion of Overseas Intellect Museums–Adaptation of Various New Technologies to Deliver Cultural Content in an Entertaining Manner."
[5] Same as above.

clearly marked. The location of the store's additional recommended products will be displayed on this map at the same time. The function allows customers' shopping process to be more effective and also become the promotional means for the store's sale and discount information, which is killing two birds with one stone [2].

In recent years, with the development of IoT, interior positioning technology can be applied in more locations. Services in places such as museums, art museums, libraries, and amusement parks all attempted to generate big data on the basis of beacon perceptive technology. Though the analyzing technology of big data, they can plan, design, and adjust various facilities to meet the demand of the public. They include smart guide systems, rapid book search service, amusement park facility waiting times, etc. They are listed in the above-mentioned application case studies [2][4][5][6]. The Exhibition installed beacon in exhibition halls and carried out integration with the exhibition application and big data platform system. After getting a hold of attendee locations using the beacon equipment, we are able to more precisely grasp the audience behavioral patterns using the interactive units of the push notifications of the application, and the audience can organize the visiting route that best suits them based on the information

3.2 Developing an Appropriate Normal Behavior Scale

In his 2004 article "A Study of Effectiveness of Interactive Multimedia Display at the National Museum of Natural Science," Yen-ming Lin[7] pointed out that one of the best methods to evaluate exhibition effects is through the observation of audience behavior. The act of tracking audience visiting routes, the exhibits seen, and time spent, etc. is called the observational method. Audience study in museums generally take the non-participant approach. Under the premise of not disturbing visitor, observers are sent to track and observe audience behaviors in the exhibition hall and record the data on scales such as visiting route, exhibits viewed, and time spent. Since the Exhibition is already installed with soft- and hardware, observers don't have to be dispatched to perform tracking. However, a behavior observation chart is still needed to assist the computer system in making records and provide program designers with algorithm logic. Therefore, the writer referred to Stephen Bitgood's 2014[8] observation chart as a basis and drew up an observation index suitable for the Exhibition and listed four common behavioral indexes: 1. Reading degree: whether the questions related to the Exhibition was correctly answered; 2. Involvement degree: the amount of time spent at each unit; 3. Operation: whether each unit is correctly operated and mission complete, 4. Discussion content: whether the experience at the Exhibition was shared on Facebook or other social network. Please see table 1 for index.

Table 1. Writer's conversion of Stephen Bitgood's observation index on behavioral analysis. (1994)

Indicator / Class / Definition	Reading degree	Involvement Degree	Operation	Discussion Content
Human Observation (Stephen Bitgood)	Read / Not read	Focused / Not focused	Cautious / Careless	Topical / Non-related
Program Interpretation Language (Converted by system)	Answered correctly / incorrectly Question on exhibition content	Length of time (seconds)	Completed correctly / Incomplete	Share experience of exhibition participation on Facebook or other social media sites

To conclude the above, in a spacious exhibition hall with a vast variety of display media, do the media help users learn? Is it easier for users to correctly absorb related scientific knowledge? These are the questions exhibition planners generally want to find the answer to. Hence, an effective information design is not only able to trigger user interest, it can also influence their behavior and learning [7]. OOVBS integrates on-site exhibition units and records audience behavior and learning history through program design, Exhibition application, and beacon, breaking the tradition of distributing questionnaires or tracking, and further analyzes the audience's cognitive, understanding, needs, and learning results, etc. on the content of the Exhibition. Then, user behavior is used to sort the the presentation method and content of display of the information at display units in the Exhibition to conduct further study and improvements, with the hopes of constructing a good and useful Online to Onsite exhibition design model.

4 THE PLANNING AND DESIGN OF CASE IMPLEMENTATION

4.1 ORIGIN OF IMPLEMENTATION

The Exhibition is a sub project proposed by the National Science and Technology Museum in 2017 in the Ministry of Education's "Smart Service, Citizen Joy in Learning–National Social Education Technology Innovative Service Project." It hopes, through the various display methods of museums, to introduce to the people the application development and future influence of IoT technology on daily lives. In order to let exhibition content and audience behavior more closely represent IoT environment, the exhibition idea is: to construct a future world of "people to people, people to object, and object to object" communication and connection. Based on that, two stories were developed to connect the entire exhibition. The first is Online to Onsite, to construct a Smart City. The basic structure of IoT is consisted of the perceptual, internet, and application layers. The visiting story of the Exhibition is built in the structure, allowing the people to view the displays using their mobile device with the Exhibition application and perception points. Online games are combined with onsite exhibitions to demonstrate what IoT is. To enhance viewing experience, the application can be used to accumulate virtual coins, which can be used to exchange the viewer's preferred items at the "actual" goods machines, reaching the IoT experience of Machine-to-Machine or Man-to-Machine (M2M) using "virtual" currency to purchase "physical" items.

The second story is statistics analysis, instantly displaying visitors' audience behavior. The ultimate goal of IoT is prediction. Therefore, through the display model of Online to Onsite, the sensory apparatus in the Exhibition and audience data are connected to allow all visitors to create their own IoT and construct a smart city through the Exhibition. Hence, to satisfy the display setting and demand, the National Science and Technology Museum advanced with an exhibition design different to before. In the past few years, the National Science and Technology Museum makes great use of the media interactive display to strengthen viewing experience. This time, apart from satisfying viewing experience, the National Science and Technology Museum also hopes to correct our designing experience through audience message transmission and application behavior.

4.2 APPLIED TECHNOLOGY AND STRUCTURE

In museums in Taiwan in the past, each display device was decentralized and operated independently. Not only was it difficult to control the operation of each device, it was also impossible to control the use of each device by each user. Therefore, with the opportunity of the Exhibition, all the interactive devices in the exhibition area are fully connected to the network, allowing IoT display to also be an actual IoT operation area. At the same time, beacons are built in the entire exhibition hall and are integrated with the accompanying application and big data platform system so that we can grasp audience behavior patterns more accurately, hence improving the accuracy and reliability of follow-up big data analysis results. The overall structure of the Exhibition OOVBS consists of three major projects, namely, "Exhibition System Structure," "Regional System Structure," and "APP Structure." The architecture and application are shown in Graphs 1 and 2.

To free the main server from the impact of traffic during the peak hours of the Exhibition, each booth will be divided into sub-servers. The main server is responsible for the eventual storage of the entire exhibition site, the exchange of sub-server data, the PHP-base API, and the internal management Dashboard. In addition, MongoDB in each sub-server is regularly backed up. Among them, to make data in different exhibition areas available for quick access, Redis uses a lightweight data storage structure in the memory to provide a space for data sharing buffers for the sub-server groups. The sub-server is mainly responsible for data exchange, collection, backup and monitoring of interactive devices, and uses agents (Socket. IO) to provide instant communication between devices and uses MongoDB for rapid data storage and sharing. It can also process requests from the main server in real time, such as pushing messages for users in the field, and further integrating information into the application.

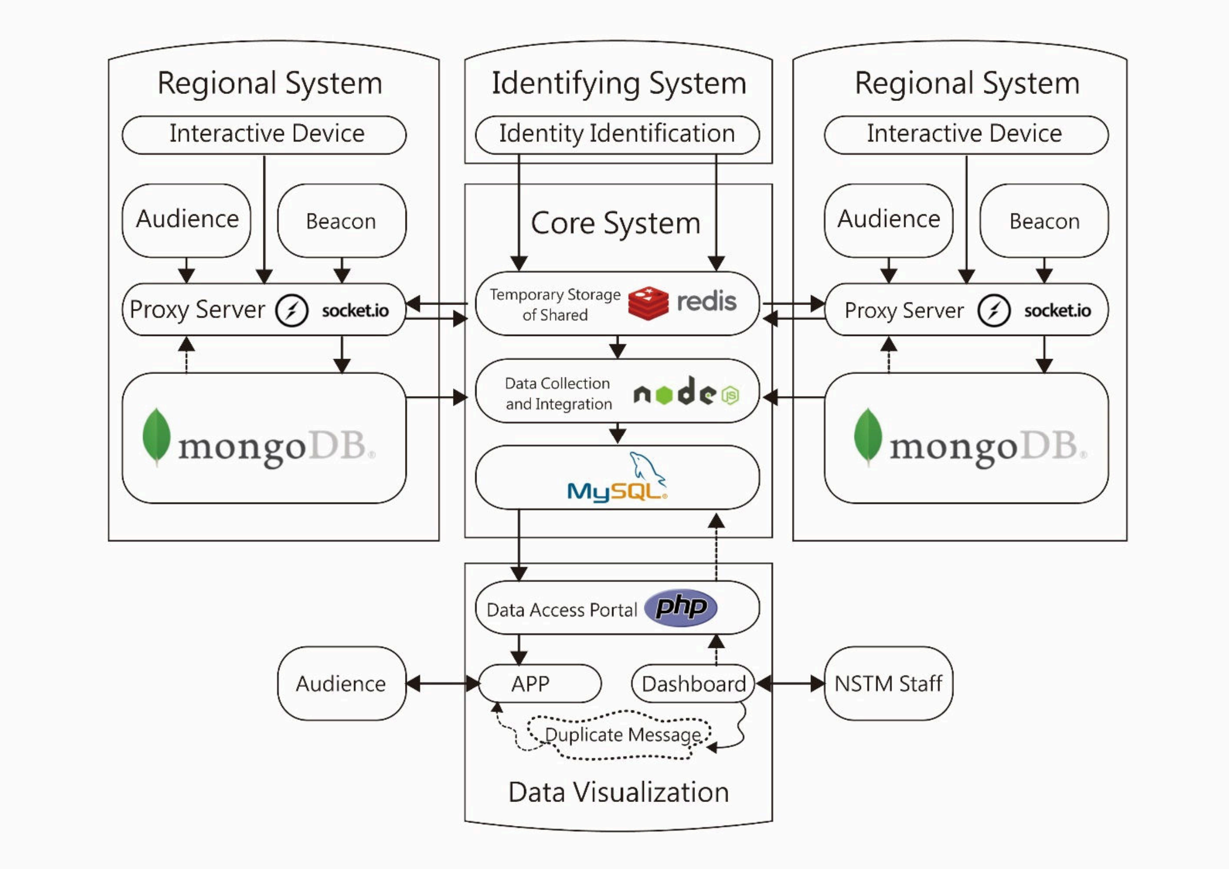

Fig. 1. Overall structure of the Online to Onsite visitor behavior system

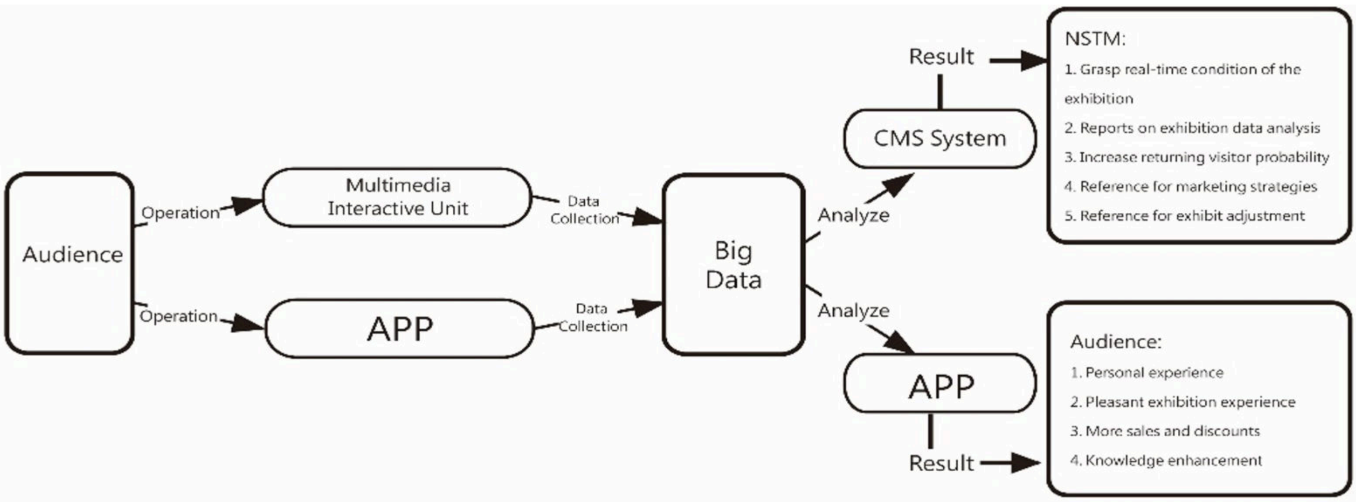

Fig. 2. Audience behavior data collection procedure and application.

4.3 PERFORMING INDEX CLASSIFICATION OF INTERACTIVE DISPLAY BEHAVIOR

The exhibition features a total of 6 display areas, 56 units, 1 small theater, 5 films, and 11 multimedia interactive units. The content and objectives of the multimedia interactive unit are compiled and designed according to the display plan of the Exhibition. Then, the expected achievement of the interactive mode and learning outcomes are reviewed. The visiting activity level index is classified into three levels and are rewarded 3-2-1 points based on high-medium-low degree of visiting behavior. This level gives the standard as well as provides interactive software programming to execute and determine the "node." As soon as the visiting public participate in the interaction, OOVBS initiates the program and records the visitor's learning trajectory. Exhibition display division, interactive unit contents, target, and leveling shown in Tables 2 and 3 respectively.

Table 2. The partition and display orientation of the Exhibition. (Drawn by Fang-yi Su)

Item	Exhibition area	Display Orientation
1	A: Now is the Future	The effects of industrial 1.0-4.0 on humans.
2	B: 0 and 1 Overturn the World	Understanding the evolution of the development and technology of the computing industry.
3	C: Virtual Neighbors	Understanding the development of the Internet from wired to wireless to unlimited.
4	D: Transboundary "Language"	Exploring the concept of IoT, its basic structure and key technology.
5	E: Smart City	Smart City: The great experience of an IoT world in all aspects of life.
6	F: Experience the Power of IoT Infinite Potential of IoT?!	Ponder that while IoT brings us more convenience in life, it could possibly invade our privacy? When robots and humans begin to co-exist, who would you trust?

Table 3. Exhibition interactive unit display content, target, and grading chart. (Drawn by Fang-yi Su)

OOVBS Evaluation Index	Exhibition Content and Target	Corresponding Interactive Display Unit	No. of Units	Level Grading Standard	Highest Total
Reading	1. Guide to understand the relationship between computer networks and our lives. What parts of your daily life is related to this topic. 2. Understand computers, Internet development related technologies, and IoT structure and development.	1. IoT Classroom 2. Understanding perceptive level – App. audio guide	2	Level 1: None correct (listen) Level 2: Half correct (listen) Level 3: All correct (listen)	6
Involvement	Understand computer development history and the evolution of Internet technology.	1. Challenge the binary method 2. Assemble a smart phone by hands	2	Level 1: 30 seconds Level 2: 60 seconds Level 3: 90 seconds	6
Operation	1. Smart City is an important area to experience IoT applications. The Exhibition simulates the changes in the normal behavior relating to food, clothing, and entertainment after smart devices infiltrate the lives of ordinary people and investigate how we can face the era of intellectualization. 2. With the rapid development of computer network technology, how we can change the face of human life from wired to wireless to unlimited. 3. Describe the key technologies of IoT and how to predict and analyze cloud computing and big data.	1. Acquaintance with the Framework of IoT's 2. Maker Network Cable 3. Experience a Smart Car 4. Cycling Health Test (smart medicine) 5. Acting as a Logistics Operator 6. Virtual Shopping with Joy	6	Level 1: Activate unit Level 2: Operate half-way Level 3: Operation complete	18
Discussion	1. How the development of technology affects IoT and Industrial 4.0. 2. Adjust self-perspective and understand the impact of technology on humans and society. Guide to understand the impact of technology in everyday life on human beings.	Share visiting experience on social network, take photos, or write review	1	Level 1: 1-2 posts Level 2: 3-4 posts Level 3: 5-7 posts	3

4.4 ACHIEVE OBJECT-LINK-NET MAN-MACHINE INTERFACE

To enable the Exhibition visitors and their data can correctly correspond to the field designed by the database, the Exhibition makes use of the accompanying application, which uses the Internet to connect interactive display units to the server. At the same time, the entity's interactive display unit uses the "node" of the program to judge the performance index, and then uses 73 beacons constructed to detect the location of the visitors and conducts an Online to Onsite interaction to achieve the goal, reaching the concatenation and integration of the object-link-net man-machine interface. After the visitors download the exhibition application and start to visit, when approaching the recorded unit, beacon will launch the user's app and respond to the unit, and then generate a bar code or number (commonly referred to as code) for visitors. After scanning the code on the entity's display interactive machine, after completing the pairing code authentication, the user begins to experience and learn.

5 DATA ANALYSIS

The data itself has no meaning until it is analyzed. Data collection is mostly passive for many organizations. Only when a problem occurs will relevant departments start analyzing data to determine and fix problems and formulate measures to prevent recurrence [9]. The Exhibition hopes to move from passive to active, through beacon technology and program nodes embedded in interactive software, to automatically retrieve data using rules and make the data useful information. The Exhibition automatically captures all visitor's current information and behaviors on the opening day through OOVBS. The system will output an EXCEL report and use the login time to log the LEVEL of the behavioral indicator after the visitors participate in the display. OOVBS collected 14,960 pieces of information from November 10,2017 (the day of the Exhibition) to February 28, 2018. After downloading the system data, SPSS for Windows 18.0 statistical software was used as an analysis tool, using descriptive statistical analysis, including: Basic information, feedback (Satisfaction and the overall performance of favorite units), and visiting behaviors. The following is a preliminary discussion and explanation of the data.

5.1 BASIC INFORMATION AND FEEDBACK FROM THE VISITING PUBLIC

There are slightly more female visitors (7,520) than male visitors (7,440) that attend this exhibition. In terms of age, the number starts from10 to under 13 (25.1%), followed by 25 to 35 (21.9%), 19 to 25 (20.9%). As for education level, universities (colleges) (52.4%) take majority. There is up to 63.1% of students in terms of visitor occupation. For the feedback, 98.4% of the visitors were satisfied with the Exhibition (57.2% very satisfied, 41.2% satisfied). In determining which interactive unit the public liked most, the "Maker Network Cable" ranked first at 32.6%, then the VR virtual reality technology incorporated interactive unit "Experience Smart Car" (22.5%) and "Virtual Shopping with Joy" (14.4%).

5.2 OVERALL PERFORMANCE OF VISITING BEHAVIOR

During the comprehensive performance of the visit, OOVBS recorded the time of visit and the level of visitation (LEVEL). According to the structure of Table 3, the degree of visit behavior was calculated by multiplying the number of interactive units by the grade points. The graded scores were divided according to the degree of participation in the unit. The level index is classified into three levels and are rewarded 3-2-1 based on high-medium-low; the system has a total of 11 units to participate in the record, the formula is as follows 2X3+2X3+6X3+1X3=33, so the highest degree of visit behavior is 33 points, the lowest is 11 points, Then according to the class spacing, "low participation" (1-11 points), "middle participation" (11-22 points), and "high participation" (22 points or more-33 points) were divided. The average time for the total exhibition of this special exhibition is 92 minutes. According to the information recorded by the beacon, the average time for each unit to be parked is 8.36 minutes. There is no specific line of sight for the visit trajectory. The level of visit behavior is based on 14,960 statistics. The minimum is 15 points and the highest is 29 points. The overall average is 22.35 points. It falls on the level of "high participation." There is no "low participation" level. It shows that when visiting the special exhibition, the visiting people are willing to try to get close to the exhibition, participate in the interaction, and understand the content of the show is not just free buttons or rotating exhibits.

In the part of the visit behavior of the four assessment indicators, due to the different number of display units, they cannot compare with each other. See Table 6. The levels of reading, involvement, and discussion are all listed in "High Participation" (average scores 4.44, 4.30, and 2.26). Among them, the reading index is given by "answering the content related questions" and answering "yes." In terms of scores, from the result of "high participation," the visiting people did a knowledge reading of the contents of the display. On the operation status indicator, they were "moderate participation" (average score of 11.35), and the judgment rating score was "correct operation. "The demonstration unit completes the mission" as a benchmark. There are two units in this special exhibition that use virtual reality to interact. From the on-site observation, it is found that many visitors are limited by physical factors (dizziness, nausea, etc.), resulting in failure to complete the operation. The assessment of the degree of participation provides the direction for future revision of virtual reality display techniques in the Science and Technology Museum, such as the degree of interaction with different ageing designs or the improvement in software programs, to better meet the needs of the audience.

Table 4. Individual evaluation index of audience behavior degree. (Drawn by Fang-yi Su)

OOVBS Evaluation Index	Audience Behavior Degree			
	Low	middle	High	
Reading	1			6 (points)
	Low	middle	High	
Involvement	1			6 (points)
	Low	middle	High	
Operation	1			18 (points)
	Low	middle	High	
Discussion	1			3 (points)

Note: This table can only be used as schematic illustration for the segment each audience behavior falls.

To understand whether the level of participation of the public is influenced by “age” and “educational level,” according to the data, Chi-square Test analysis and statistics are used. However, because there is no “low participation” level, the number of non-conformance checks by the Less than 5, to avoid significant deviations in the results of the analysis, the “merge” and “educational” data were merged using the fine-grained merger method. Tables 7 and 8 show the 2X2 contingency table for the participation of the public and the two variables of “age” and “education level.” In terms of age, Person Chi-Square (χ2) values and independence chi-square test results, χ2 value is equal to 23.759, df=1, p=.000<.05, reaching a significant level, and in education degree χ2 value is equal to 6.706, df = 1, p = .010 <.05, also achieved significant, indicating that the level of participation of the visiting people is influenced by “age” and “educational level” and is related. OOVBS is an innovative design concept of Bend exhibition. It is also rare for museums to use technology to record visitors’ visits. It has been used for more than 4 months and will be extended to the permanent exhibition halls of the science museum every year. A large amount of data will gradually be formed, and the variety of data and the true and false judgments of the data will require more techniques and experiences to conduct data mining, including: classification, estimation, prediction, correlation grouping or association rules. The article begins with a preliminary discussion of some of the data.

Table 5. Statistics and Chi-square test of audience behavior degree and age. (2*2 contingency table) (Drawn by Fang-yi Su)

Age	Audience Behavior Degree		(df)	(χ^2)
	Moderate	High		
10-25	4,480	3,840	1	23.759
25-65+	3,840	2,800		
Total	8,320	6,640		

Table 6. Statistics and Chi-square test of audience behavior degree and education. (2*2 contingency table) (Drawn by Fang-yi Su)

Education Level	Audience Behavior Degree		(df)	(χ^2)
	Moderate	High		
Elementary School – High / Vocational School	3,280	2,480	1	6.706
University / College – Graduate School	5,040	4,160		
Total	8,320	6,640		

6 Conclusion

The Exhibition is not only a subproject of the Science Museum's four-year plan of the Smart Museum, but also the celebration of the 20th anniversary of the Science Museum. It represents the beginning and end of the project. Therefore, the author takes this Exhibition as a practical field. While planning, designing, and producing the exhibits, it also integrated the structure of the visit behavior database into the exhibition, proposed a virtual and real integrated wisdom museum display model, and through actual implementation, established the audience database of the special exhibition and recorded it to assess audience visit behavior and learning mode. On the one hand, human beings are constantly creating materials. On the other hand, they can use these materials to create the future. The information created daily may be individual or partial, and the information obtained is macroscopic and global. It will approach the basics of things through analysis and research[10]. With the change of the times, the Internet has developed rapidly, the amount of data on the Internet has also increased day by day, and the data in various fields has also begun to become complicated. How to extract useful information from these large amounts of information, organizations, and new business model development and opportunities is an important issue in the development of technology in the new century.

Museum exhibitions and educational activities have always been the representatives of innovative models. The future museums must also be oriented towards intelligent management and tailor-made museum display activities for people of different ages and occupations. Museums can pinpoint the preferences of their target audience and then push a variety of suitable cultural activities to allow them to participate in the museum's innovative cultural activities in addition to the exhibition, rely on big data support, can put a family, an area, and even The characteristics, preference, purpose, and experience of the museum audience of the whole country are captured, which helps museums make forward-looking decisions, such as how to organize events, how to plan audiences' favorite shows, and how to accurately market them. It will then conduct research and make advance judgments about future markets [11]. This is also the goal of the IoT world. It is expected that the data collected by sensing elements will be used for data analysis, and ultimately forecasts will be made to accurately market and make decisions.

In recent years, big data and its related applications have become an e-commerce industry. The use of big data has a destructive and innovative effect on the retail industry[12]. It is believed that the museum will be able to use the successful models of other industries to develop smart services that suit itself. This article explores the design practice sharing and the current collection of visit materials developed by the Science and Technology Museum and hopes to discover more museums' applicable scope through the construction and implementation of this case, service model, and utility. Only this article will be used to provide a new perspective on the service performance of museum museums.

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