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藝術博物館與谷歌：應用網頁流量分析方法探討博物館加入谷歌藝術計畫之成效[1]

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Art Museum on Google: A Web Log Analysis of Museum's Participation in Google Art Project

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關鍵詞：博物館、谷歌藝術計畫、Google Analytics、網站流量（日誌）分析

Keywords: Museum, Google Art Project, Google Analytics, Web log analysis

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摘要

2011 年起，谷歌公司推出了以藝術類博物館爲主的平台 Google Art Project (GAP)以來，便引起了博物館界的重視和討論。至 2012 年，國立故宮博物院（以下簡稱故宮），在經過評估和討論之後，也加入了 GAP 的第二階段，成爲 GAP 的成員之一。本文以網頁流量分析方法爲主，輔以觀眾意見分析等方法，評估故宮加入 GAP 之後的成效和反應。結果顯示，故宮在 GAP 平台上的內容，在約半年時間之中，共吸引 9,341 人次造訪，大部份造訪者來自美國，但造訪者電腦使用的語言卻大多爲中文系統，英文居次。而造訪者使用行動載具比率不高，再次造訪比率亦低；大多數使用者經由搜尋引擎或社群網站造訪，但經由教育類網站造訪故宮 GAP 專頁的卻很少。經由交叉分析也發現，造訪者的語言和文化背景是影響造訪者進一步深入瀏覽 GAP 故宮專頁的重要因素。此外，結果顯示，博物館加入 GAP 的行銷效果極佳，觀眾反應也相當正面；但建議未來故宮應增加上傳在 GAP 平台上的內容，並提升影像品質。

Abstract

In 2011, Google introduced the world an art museum orientated online platform called the Google Art Project (GAP), since then, GAP had drawn immense discussions and attentions from museum communities. In 2012, the National Palace Museum (NPM) decided to collaborate with GAP after internal evaluation and discussions. This paper takes Web Log Analysis as the main research method, and conducts web traffic analysis on NPM web pages on GAP through Google Analytics, supplemented by visitors' feedback on Museum's participation in GAP, traffic reports in Museum's official website, statistical analysis of media exposure and other analysis of related materials. This analysis found that the NPM's page had a total of 9,341 visits in the GAP since April 2013. Most visits were from the United States, but most visitors speak Chinese, followed by

English. The proportion of those using mobile devices for their visit was relatively low and the rate of revisiting was not high either. Most visitors were introduced to the NPM on GAP through either search engines or social networking sites, and the proportion which was introduced through the related sites of educational resources was not high. By cross-reference analysis of visitor languages and page title, it was found that language and cultural backgrounds were critical factors in affecting visitors' willingness to further browse the pages. In addition, the results had been extremely favorable in the areas of museum marketing and news value; although opinions from most of the visitors were positive, few had noticed that the content uploaded by NPM onto GAP is relatively limited and the image quality could be improved.

Introduction

In February 2011, Google set out an art museum oriented Google Art Project (GAP), which immediately brought about vast discussions and drew wide attentions. That is a manifestation that Google has expanded its business territory from the text-centric Google Book Search and Google Scholar to the brand new arena of museums. GAP features innovations that are distinguished from the traditional museum websites, and it was very rare in the past that such an information giant collaborating with global museums. Therefore, even though it has been for quite a while since the setout of GAP, it is still the eye catching project garnering all the attentions, and the number of museums participating in the project as well as the website contents have been growing ever since, along with the constant updates of the website functionality and screen layouts.

By taking into consideration elements such as enhancing the Museum's visibility and marketing strength, increasing the Museum's website traffic, offering visitors novel access channels to the art information, as well as reinforcing the Museum's educational functions, National Palace Museum (NPM) in 2012 made a prudential study with a number of meetings and discussions, and decided to join the GAP Phase II in becoming a GAP partner. After joining the GAP, however, the Museum needed to analyze the efficacy of the participation and evaluate the effectiveness of marketing and education, so as to make appropriate enhancement of the Museum's contents on the GAP website, or integrate GAP into the Museum's educational activities and internet resources planning. Therefore, this study takes the Web Log Analysis approach and uses the Google Analytics to analyze the website traffic of the Museum's contents on the GAP website, meanwhile website traffic on the Museum's official website is also accommodated in the Log Analysis scope. In addition, visitors' comments on the Museum's participation in the GAP and the statistics of the Museum's media

exposure are also surveyed for complementary data, in an effort to highlight the performance and issues after the Museum's joining the ranks of GAP. Hopefully, the study results can help to build a foundation for the Museum's future planning on the GAP.

To begin with, this paper briefly introduces the background of GAP, and then by way of inducing opinions and views on the GAP from various points of view, this paper analyzes the possible advantages GAP can bring to museums and its potential restrictions, followed by the description of the research methods. The third part of this paper is the analysis of the performance of the Museum's joining the GAP. Finally the last part includes the conclusion on the performance and issues of the Museum's participation in the GAP and suggestions to people engaged in the museum sector.

Background: Google Art Project and Museums

Google Art Project originates from the well-known Google "*20-percent Time Project*", with which Google's employees can use 20% of their weekly work hours to explore and conceive new projects or ideas of their own to initiate (Berwick, 2011). GAP was exactly the product of a new project created by a group of Google art-loving employees who used the 20% of their weekly work hours in trying to apply the technologies of Picasa, Street View, YouTube and Google Map to let museums all over the world cross over the geographical boundaries and time restrictions to display their art treasure collections to the world by online queries anytime and anywhere (Mediati, 2011). With great efforts by Google, this concept was finally realized in 2011. Phase I includes 17 popular museums such as MoMA, Metropolitan Museum of Arts and Tate Museum, which provided images of their collections to GAP and allows Google staff to enter their exhibit room to take photos. Through the years of constant growing, in year 2013, the number of museums participating in GAP has

exceeded 260 and the images of museum collections have reached 46,559 pieces. During this period of time, the GAP functions and interface were improved and updated many times, and the Art Talk platform, connecting to Google Cultural Institute, was also established for art exchange and communications among the world museums.

Since its inception, GAP has attracted lots of attentions and discussions from the museum sector and other territories, and the opinions and views on GAP are versatile, with both positive and negative comments. This study review various published materials including journal articles, newspapers and website data regarding the points of view on GAP, and found out that people in various fields are mostly with positive views on GAP, though some insist that GAP has its limits. Following are the positive views on GAP and its possible limits:

I. Positive or affirmative comments

1. From the standpoint of fulfilling the museum missions and promoting museums' operational performances

   (1) Some people engaged in the museum sector argue that the advantages of GAP are its free of charge and easy to use features, which can promote museums' public engagement, and fulfill museums' public service missions (Gordon, 2013). In the meantime, museums with the GAP can facilitate more people to gain accesses to art information, and in terms of information availability, it stands for a more democratic atmosphere (America, 2012).

   (2) The GAP offers a distinguished webpage browsing mechanism that is unparalleled by other websites, and its innovative connotations make some museum experts believe that the emergence of GAP indicates the future trend of museum website designs, a transformation from the

traditional contents-centric approach to a context-focused emphasis, whose innovative features will enlighten the museum webpage designers with new ideas (Proctor, 2011). Also, staff of museums participating in the GAP and some museum experts also contend that joining the GAP does promote the museums' website traffic and there have no signs showing any negative impact on the crowdedness of visitors to the physical museums (Proctor, 2011; Brown, 2011; Bickersteth, 2011).

2. From the standpoint of educational functions and art information promotions

   (1) According to many reports and comments, museums participating in the GAP have gained one major advantage, i.e. obtaining a platform that allows Internet users to not only enjoy watching the museum collections from all over the world, but also benefit from the educational functions across the geographical boundaries and time limits, so that they can enjoy watching the world museum collections without having to pay colossal money and time and endure the crowdedness in the physical museums (Smith, 2011; Pack, 2011; Allan, 2012).

   (2) On the schooling aspect, the GAP also has its sway. Take the fine art courses for instance. The GAP super image resolution, Gigapixel, allows the visitors to observe every delicate touch of the art works and canvas texture in full details. Teachers can use the interactive whiteboard to link GAP for discourse. Such great facilities substantially help the fine art education (Grasso, 2011; Smith, 2011; Allan, 2012). Moreover, GAP contents can be used as reference data complementary to the traditional art databases such as ARTstor and Williams Visual Resources (TechFest, 2011; Berwick, 2011).

3. From the standpoint of offering viewer's experience and user friendliness

(1) Google has huge number of technical staffs and service points around the globe, plus its global influences, that makes the GAP capable of accommodating museums in every corner of the world into its GAP collaboration arena, forming an United Nations of Art that contains versatile categories and themes of collections. This makes one direct benefit - Internet visitors under this huge GAP technologic umbrella can query and view museum collections from all over the world on a single website instead of visiting different museum websites as they used to (Proctor, 2011; Smith, 2011b; Smith, 2012).

(2) The GAP offers the cross-borders, cross-museums and cross-materials mechanism that enables visitors to query for information of desired art objects and then use the GAP personalized collection functions to build their own personal collection vaults. Although in the past there had been many museums offering such a functionality of Personal Digital Collections (Marty, 2010), the GAP is distinguished in that it allows visitors to build collections composed of images from a huge number of museums all over the world in a single platform, other than building separate collections on separate museum web platforms.

(3) Since GAP has applied many Google services such as Google Map and YouTube, visitors only need their Gmail accounts to use the GAP personalization functions as well as other Google services, in one integrated, consistent user interface. In addition, Google services have already gained an important role in internet users' daily life, and that makes it much easier for visitors to connect the GAP experience with daily internet activities, without having to fit into unfamiliar functions or styles of different websites (Proctor, 2011; Allan, 2012). Also this

advantage will make museums contemplate whether they need to have a consistent styles and user interface for their website pages, so that their visitors can have easier accesses to their museum internet resources.

(4) The GAP provides a vast volume of high resolution images of art works and allows visitors to zoom in and zoom out to view the art work images. In addition, the Google staff has also taken photos for some museums and made the ultra high resolution Gigapixel images that allows visitors to observe every detail of the art works online. Notably, these details may not be easily, or may never be, observed when you actually stand in front of the objects in the physical museums (Smith, 2011b; Wermuth, 2011). Moreover, the GAP integrates the Street View functions, allowing visitors to experience the magnificent, gorgeous landscapes inside great museums, and this was rarely available in the past (Smith, 2011). The GAP contains Gigapixel and Street View to offer visitors brand new experiences that are not available on traditional museum websites and art image databases.

(5) Some critics point out that today's youths, especially born after year 2000, get to know the world in their own way that is different from their previous generation. The youths heavily rely on the Internet, smart phones, and computers, and they download digital contents to digital devices for use (Grasso, 2011). Therefore, for people engaged in the art education, it is necessary to understand the channels that the new generation takes for accesses to art information, and perhaps the emergence of GAP is a much better opportunity for offering the art learning resources to the new generation students. Besides, the virtual experience obtained from the online viewing of the art works and the physical experience from visiting the physical museums cannot be easily

distinguished with dichotomy; in fact, in the world of the new generation, maybe these two experiences can be complementary to each other and making each other stronger impression (Grasso, 2011).

II. Opinions that GAP has its limits

1. From the standpoint of the GAP connotations

(1) Many critics point out that GAP may be restricted by copyright issues, thus many 20th century modern art works and contemporary art works are absent in GAP; and its post-war art works and abstract expressionist art works are also inadequate (Proctor, 2011; Smith, 2012; Gordon, 2013). Such shortage could mislead the internet users in understanding the art history.

(2) As of writing, there are still many major museums holding a wait and see attitude toward GAP, such as Louvre Museum and most of the Swiss museums, bringing the GAP contents less comprehensive (Smith, 2012; Smith, 2011b).

(3) The collections in the GAP have inconsistence in contribution across museum to museum, in that some of the museums provide only a dozen object images while others provide more than 3000 pieces of object images (Smith, 2012; Smith, 2011a).

2. From the standpoint of the GAP experience

(1) Some critics who are more favorable to the traditional ways on art works do not quite appreciate Gigapixel and Street View, and even criticize these technologies. They argue that Gigapixel enlarges the art works to such an extent that it becomes meaningless in terms of appreciating art works, and that's just like a doctor examines a patient's skin; after all,

when the art works were created, they were not in the first place intended for such close observations. Also, it's the Street View that may twist the spatial sense inside the museums due to the shooting angles, plus the art works may be blurred from time to time, making the scenes from Street View a bit awkward and weird (Perl, 2011; Ballard, 2012; Visser, 2011). Simply put, in the eyes of some art lovers and museum goers, the art appreciation experience from physical museums is never replaceable with modern substances like GAP, which to them only offers a kind of mechanic aesthetics, offering no touch feelings and thrills that happen only when you stand right in front of the actual art works (Ballard, 2012; Grasso, 2011).

(2) Due to its abundant contents and huge image collections of art works, the GAP's system bugs or incorrect information are inevitable (Smith, 2011a). Some GAP users also argue that the museum floor maps and navigation are not quite practical in use (Proctor, 2011).

(3) Although the GAP has successfully gathered huge image collections from many large museums, and established the mechanism of viewing, query and retrieval, some users point out that GAP actually does not have any curatorial direction (TechFest, 2011).

3. From the standpoint of GAP operations

(1) Due to Google's global influences, museums believe that participation in the GAP can bring positive impact to their marketing and open up a more accessible channel to their collection information. However, some critics argue that museums handing their art information over to an international enterprise giant that is globally dominant like Google may not be a proper way to treat arts (Visser, 2011).

(2) After all, Google is a commercial corporation with pressures of making profits for survival and growth. As a result, some people doubt that Google can provide a ever-lasting GAP operations, and keep investing in the GAP resources and expanding its contents without too much commercial considerations. This is something really matters and deserves a great attention (Proctor, 2011).

(3) In the past, Google had legal litigations against organizations like Authors Guild in setting forth its Google Book Search. Some people in the museum circle are concerned whether they'll be involved in legal issues if they participate in the GAP. In the meantime, some also point out that Google currently only makes contacts with individual museums without the intervention of artist copyright agents such as Artist Right Society (ARS) for negotiations and authorizations and, as a result, each museum has to try on its own to acquire complete rights of the art work images before posting them on the GAP (Gordon, 2012).

After reviewing of the positive and negative comments on museums participating in the GAP, we've learned the positive side is that the GAP satisfies museums' missions, increases accessibility to art information, promotes the traffic of the museum websites, brings in marketing efficacy, as well as provides educational resources and tools, offers visitors novel internet browsing experience, allows sharing of cross-border and inter-museums art information, and meets the younger generation's modern way of living and learning that is heavily reliant on the internet. However, museums should also look to the reality that the GAP contents may not be all adequate, and some art lovers and museum goers prefer the traditional way of appreciating art works; as for the GAP? Not in their thoughts.

Of course, the efficacy of joining the GAP has been recognized by many

museums worldwide, and that's why more and more museums are joining the ranks. Nevertheless, museums after joining the GAP cannot just leave the images of their collections on the GAP platform without giving appropriate assessments on the efficacy of joining the project, they should take necessary measures to make GAP more helpful in the promotion of museum educations. By doing this, as the only way, can bring positive meanings to museums participating in the GAP, and make the aforementioned positive comments realized. Therefore, by taking the Web Log as the primary data, aided with other relevant materials, this study explores the efficacy of National Palace Museum's participation in the GAP, and provides the study results as a reference for future planning.

Research Methods

In order for a complete exploration of National Palace Museum's participation in the GAP and its efficacy, various research methods were taken for analyses on data from various sources. This study takes the Web Log Analysis as the main research method, collocated with analyses of other complementary data, described as follows:

I. The main research method

For the Web Log Analysis, the Google Analytics is used to analyze the website traffic on the National Palace Museum's GAP platform in order to acquire the data of the number of visit, visitors' behaviors, visits' session duration, visitors' logon location, etc. This analysis allows a very direct observation on the efficacy of the Museum's participation in the GAP. Also included in this study are the website traffic on the Museum's own official website for cross-reference comparison against the GAP platform.

In fact, Web Log Analysis is regarded as one of the Transaction Log

Analysis (TLA) methods, which analyze the Log file contents generated by the information system in order to understand the user behaviors, the interaction between the system and its users, and the system performance (Jamali, Nicholas & Huntington, 2005). The TLA conception has been a long history - it was incepted around 1960s, and not until the 1990s when websites flourished and website log files became a mainstream of computer records, did more and more people start to analyze the web log file contents and, as a result, the Web Log Analysis became one of the common methods for studying web users' behaviors in order to improve the website design and management (Lin & Hong, 2010 ; Jamali, Nicholas & Huntington, 2005).

Currently, there are more than 100 different packages of Web Log Analysis software available in the market. They can be divided into two categories - the ones making direct analysis on log files already generated, and the others that use page tagging approach to generate log files for analysis (Voorbij, 2010). The Google Analytics tool is a page tagging type web log analysis system. In summary, the web log analysis has the following merits and drawbacks:

1. It can quickly collect a vast volume of multi-directional data for analysis (Fang, 2007), suitable for the studies of system performance, user behaviors and high evidence oriented researches (Jamali, Nicholas & Huntington, 2005).

2. Compared with surveys and interviews, the web log analysis offers a more economic way of data entry and collection, due to the auto-generated log files. Also, it is not restricted by the study objects and the geographical boundaries (Fang, 2007).

3. The web log analysis is a non-invasive approach, meaning it will not be misled or interfered by the subjects, and the auto-generated data are more

objective (Lin & Hong, 2010; Jamali, Nicholas & Huntington, 2005).

4. Theoretically, if the information system could keep on running, the log data could be generated continuously. Therefore, the web log analysis is very suitable for studies that need to collect longitudinal data (Lin & Hong, 2010; Jamali, Nicholas & Huntington, 2005).

5. The web request statistics can be interfered by the cache, thus losing its data accuracy. And Spiders, Robots and Crawlers can also affect the accuracy of the web log data (Jamali, Nicholas & Huntington, 2005).

6. The web log analysis has no way to determine the users' motives, emotions and attitudes. As a result, other collocated approaches may be needed to understand those intangible features.

7. On a same website, using different web log analysis software can get different statistics. Besides, in some circumstances, it is very difficult to authenticate the user identity with the web log analysis. For example, the same user can log in from different computers, or multiple users share one single account (Voorbij, 2010).

II. The auxiliary methods

To have a profound understanding of the opinions on National Palace Museum's participation in the GAP, from people in various sectors, so as to make a complete assessment on the efficacy of the Museum's participation in the GAP, this study collects visitors' comments from emails and Facebook as well as comments from other museums and Internet blogs. The media exposure rates and media participation in the Museum's activities are also taken into account for the analysis.

In summary, this study takes the web log analysis as the main research

approach. The Google Analytics is used to analyze the website traffic on the Museum's GAP platform as well as on the Museum's own official website. As for the auxiliary methods, this study extracts the visitors' opinions expressed via emails and Facebook, and takes in the media exposure rate after the Museum's participation in the GAP, along with the number of media participating in the Museum's press conferences and activities. All the efforts are for the most complete exploration of the efficacy of the Museum's participation in the GAP. The research methods, analysis tools and objects, and the data collection periods are compiled and listed in the following Table 1.

Table 1 Research methods, analysis tools and objects, data collection periods

Research method	Analysis tools	Data collection period
Web Log Analysis	Google Analytics (for NPM on GAP)	2013/4/21-2013/9/4
	Webtrends (for NPM's Official Web Site)	2011/4/1-2013/4/1
Analysis on relevant materials	Viewer opinions expressed via FB, E-mail, newspapers	2012/4/10-2012/4/24
	Opinions from staff of other museums	2012/4/10-2012/4/24
	The number of media participating NPM activities and NPM media exposure rate	2012/4/10/-2012/9/15

Source: Complied by Shao-Chu Wu

Study Results

I. The current status of the website traffic

On April 21, 2013, National Palace Museum started to use the Google Analytics to analyze its GAP platform website traffic. And up to September 4 of the same year, there had been 9,341 visits for a total of 64,366 browsing pages, with 6,401 visitors, 32.6% of which are new visitors, and visitors having more

than one time of login take 67.4% of the total visitors. And the detailed usage shows that the average visiting residence time is 5 minutes and 21 seconds, and each visit goes through an average of 6.89 pages, with an average bounce rate of 57.33%.

Table 2 is the overall usage of the NPM GAP platform. Figure 1 is the number of visits per week of NPM on GAP.

Table 2 The overall usage of NPM on GAP

	Visits	Browsing Pages	Visitors	New visitors	Returning visitors	Bounce rate
PM on GAP	9,341	64,366	6,401	32.6%	67.4%	57.33%

Source: Original data from Google Analytics, and complied by Shao-Chu Wu

II. Demographics of Visitors

In the analysis of the sources of visitor on the Museum's GAP platform, it is found that the visitors have some identifiable characteristics. According to the statistics generated from the Google Analytics, among all the visitors, the majority

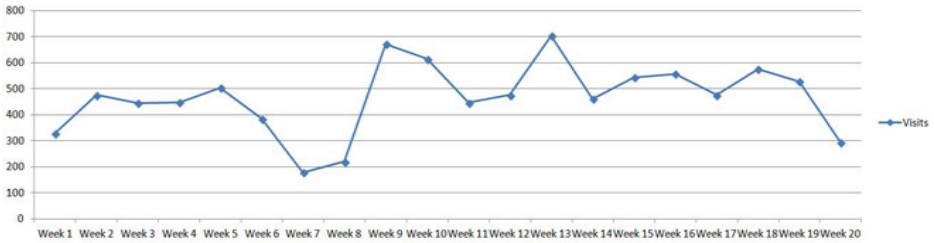

Fig. 1 The number of visits per week of NPM on GAP
Source: Original data from Google Analytics

of visitors logon from the United States and accounts for 20.6%, followed by 18.4% of Taiwan, and then the 15.1% of Mainland China, 5.3% of British, 3.8% of Japan (Table 3). Although visitors logon from U.S are the majority of the visitors, the most used webpage language is Mandarin, in which visitors for the combination of traditional and simplified Chinese takes 49% of the top 5 visitor's webpage language, meanwhile visitors for English take 42%. Figure 2 is the percentage of top 5 visitors' webpage languages of NPM on GAP.

Table 3 Top five countries of visitors to NPM GAP platform

Country	Visit Rate
The U.S.	20.6 %
Taiwan	18.4 %
China	15.1 %
British	5.3 %
Japan	3.8 %

Source: Original data from Google Analytics, and complied by Shao-Chu Wu

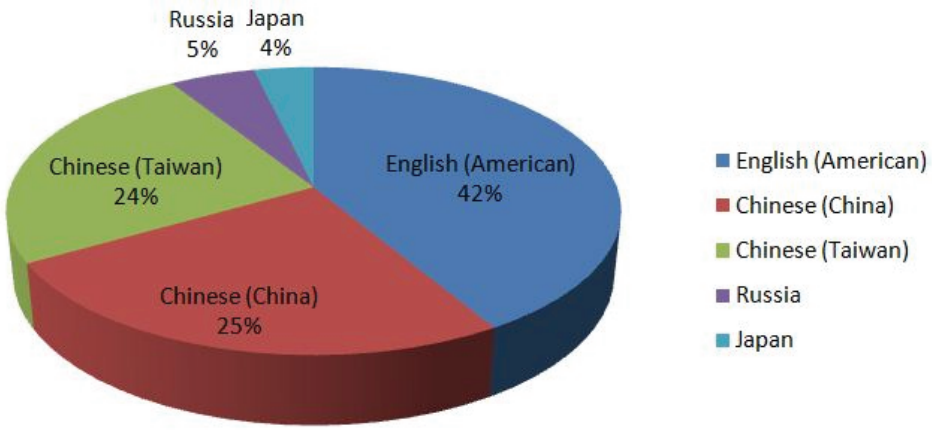

Fig. 2 Percentage of top five visitor's webpage language to NPM GAP platform
Source: Original data from Google Analytics

A further analysis on the cities of the visitors shows that the City of Taipei takes the largest portion of the visitors which is 6.2%, followed by the 4.2% of London, and then 3.1% of Portland, 2.7% of Beijing. Notably, the American City of Portland unexpectedly has a much higher visitor volumes than the major U.S. cities of New York and Los Angeles. And this is something really deserves an exploration. To this end, this study makes a further analysis on the sources of the visitors, along with a cross comparison with the cities of the visitors. The result reveals that direct links to the Museum's GAP website are the majority, followed by links via Google search, and thirdly it is the transfer links through the website called "pps.k12.or.us". Other sources of website transfers include Mobile01, Baidu, Douban, Facebook, Google+, etc., among which Mobile01, Baidu, Douban are the most popular social websites in the Chinese cultural circles. After a cross comparison of the cities and visitors, it is found that the No. 3 visitor source "pps.k12.or.us" website is located exactly in the No. 3 visitor city of Portland, and this website is educational with abundant resources and contents. Visitor sources comparison with visitor's cities are listed in Table 4. Based on our analysis, it's very likely that the combination of the Museum's contents on the GAP platform with educational websites can greatly increase the Museum's visit rate, and this is exactly one of the purposes of the Museum's participation in the

Table 4 Visit sources comparison with visitor's cities

City	Visit Source	Visit Rate
London	direct	2.3%
Taipei	direct	2.2%
Portland	pps.k12.or.us	2%
London	Google	1.7%
Taipei	Google	1.5%

Source: Original data from Google Analytics, and complied by Shao-Chu Wu

GAP. However, the statistics reveals that currently there is only one educational website "pps.k12.or.us" that connects to the NPM's GAP platform.

III. The visitors' behaviors

How do the visitors access the Museum's contents on the GAP platform, i.e. what are the visitors behaviors, is one of the referential indicators in the assessment of the efficacy of the Museum's participation in the GAP as well as the actual demands by the visitors.

Firstly, it is the residence time and number of web pages visitors go through. This study has found that most of the visitors stay on the website for a very short time, in that 62.2% of the visits stay less than 10 seconds, and only 23.6% of the visits staying more than 60 seconds. Apparently, most visitors just take a glimpse at the Museum's GAP page and then bounce out. On the number of web pages browsed, 57.33% of the browsing takes only one page, and only 9.83% has more than 10 pages of browsing. The residence time and number of pages browsed are listed in Table 5 and Table 6, respectively. Since most visitors stay for a short time and most of them just browse a single page, it is reasonable to assume that most visitors jumping to the website are just for curiosity or temporarily attracted by the news jointly edited by the Museum and Google. Looking at the time duration visitors stayed on NPM’s GAP page, the visiting time is not much different from other generic portal sites, few stayed for an extended period of time, visitors stayed for a particular interest (such as search a certain artifact information or looking at website design) for only a short while remain the majority.

When visitors log onto the Museum's GAP homepage, what web pages do they browse? and what artifacts are most interesting to the them? These are the questions to be answered. To this end, this study uses the Google Analytics to

acquire the top 50 most frequently browsed web pages of the Museum's GAP website and, according to the titles of the web pages, divides the pages into two categories - the pages with specific artifacts data and the others as portals or for queries. The browsing volumes of these two categories are then surveyed, and the statistics shows that the browsing volumes of the artifacts pages take 67% of the browsing of the top 50 most frequently viewed pages while the portal or query pages take 33% (Table 7). Apparently, the artifact data including images and text is still the main reasons attracting visitors' deeper browsing. Meanwhile, the most frequently browsed artifacts pieces are the Curio Box, Picture of the New Year and Jadeite Cabbage. There are many possible reasons behind the high

Table 5 Visit Duration

	Less than 10 seconds	More than 60 seconds
Proportion to total visits	62.2%	23.6%

Source: Original data from Google Analytics, and complied by Shao-Chu Wu

Table 6 Pages browsed by visits

	One page	More than 10 pages
Proportion to total visits	57.33%	9.83%

Source: Original data from Google Analytics, and complied by Shao-Chu Wu

Table 7 Browsing volumes of the web pages by categories

	Pages with Artifacts information	Pages of portals or for queries
Proportion of the top 50 most frequently browsed web pages	67%	33%

Source: Original data from Google Analytics, and complied by Shao-Chu Wu

browsing volumes of these 3 masterpieces. First of all, the Picture of the New Year was not well known previously, but after National Palace Museum chose it for the GAP Gigapixel shooting, the photos were published on newspapers, thus bringing in vast visitor interests. As for the Jadeite Cabbage and Curio Box, these were already highly popular objects before joining the GAP, therefore their high browsing volumes are not surprising at all. The top 5 most frequently browsed web pages of artifacts are listed in Table 8. It is evidenced that the key to increasing the spread and browsing volumes of the art information through the GAP is whether the artifacts posted on the web pages are interesting enough to attract visitors.

To find out whether visitors' identities and backgrounds affect their browsing behaviors on the Museum's GAP website, this study cross-compares the visit volumes of these two web page categories with the languages used by the visitors. And the result shows that visitors using English have 8.28% of browsing pointing to the portal and query pages and 11.92% pointing to pages with specific artifacts, and the difference is insignificance. On the other hand, visitors using Chinese have 24.76% of browsing pointing to the portal or query

Table 8 Top 5 most frequently browsed NPM GA

Name of Artifact	Proportion of top 50 most frequently browsed web pages	Rank
Curio Box	20.31%	1
Picture of the New Year	14.86%	2
Jadeite Cabbage	6.6%	3
Traveler Among Mountains and Streams	3.43%	4
Oblation Zun	2.64%	5

Source: Original data from Google Analytics, and complied by Shao-Chu Wu

pages, and 55.04% pointing to page with specific artifacts, and the difference is substantial. The fact tells the reality that the language and cultural backgrounds are critical factors affecting visitors' intention to go further browsing the artifacts. The results of cross-reference analysis of visitors' webpage languages vs. web page categories are shown in Table 9.

IV. Visitors' technologies and tools

According to the statistics, visitors of the Museum's GAP website use various technologies and devices. There are as many as 91% of the visitors using desktop computers, 5.7% using tablet, 3% using mobile phones. It is evidenced that most art loving people and museum goers tend to use desktop computers with larger screens for better experience in viewing the art works. However, the GAP has yet to launch its official App or mobile web, and that could be one of the reasons why tablet PCs and mobile phones are not popular yet in the GAP application. The most popular operating systems used in the tablet PCs and mobile phones with the GAP are iOS which takes 74.8%, followed by Android which takes 24%. The visitors GAP website devices and bounce rates are listed in Table 10.

Table 9 Cross-reference analysis of visitors' webpage languages vs. web page categories

	Proportion of browsing pointing to portal or query pages	Proportion of browsing pointing to artifacts pages
visitors using the English webpage	8.28%	11.92%
visitors using the Chinese webpage	24.76%	55.04%

Source: Original data from Google Analytics, and complied by Shao-Chu Wu

The most frequently used browser is Chrome which takes 53.8% of all the browsers used for the GAP, followed by the 14.8% of Safari, 13.4% of Firefox, 13.3% of IE and 1.2% of Android. Notably, visitors with mobile devices have an averaged bounce rate of 64.47%, higher than the 57.33% bounce rate of the overall visitors, and 56.6% of the visitors with desktop computers.

But visitors with mobile phones have a bounce rate as high as 70.1% - an evidence that mobile devices may not be ideal tools for viewing art works, and the display of art works as well as the query effects on a small screen may not satisfy the demands of art loving people and museum goers either.

V. Comments on National Palace Museum's participation in the GAP and the number of people engaged in relevant events

National Palace Museum is one of the most representative art museums in Taiwan and the greater China region. It has a huge number of visitors to its physical site every day and its website is also heavily browsed. Consequently, its every move draws great attentions from the public. Since the Museum's participation in the GAP, there have been lots of comments from its website visitors, physical site visitors, and staff of other museums, via the channels of the Museum's official Facebook, email, seminars and newspapers. These comments will be helpful to the Museum in the course of improving its GAP contents and

Table 10 Visit NPM on GAP website devices and bounce rates

Device	Visit Rate	Bounce Rate
Desktop	91.2%	56.6%
Tablet	5.7%	60.9%
Mobile	3%	70.1%

Source: Original data from Google Analytics, and complied by Shao-Chu Wu

understanding its visitors' needs. Both positive and negative, these comments are described as follows:

1. Positive and supportive comments

   (1) People believe that the Museum's participation in the GAP offers another access channel to the art works, without having to squeeze in the crowds at the physical site.

   (2) Some experts and scholars say in meetings that the Museum's participation in the GAP stands for the collaboration between the cultural and technological innovation and establish a model of creating new value for visitor experiences.

   (3) Staff from other museums believe that the Museum's participation in the GAP is worth followed by other Taiwan museums.

   (4) Some website visitors are very curious about and interested in knowing how the painting art works are presented with Gigapixel and the effect of the Street View.

   (5) Some website visitors just press the "Like" button on their Facebook, and the total count is about 225 clicks.

2. Criticism and suggestions on improvement

   (1) Some website visitors complain that the quality of images the Museum provided to the GAP are not good enough.

   (2) Most people are positive toward the Museum's participation in the GAP, but the most criticized aspect is about the very low quantity of images the Museum provided to the GAP. There are only 18 pieces.

Regardless of the comments, National Palace Museum's participation in the GAP has brought about amazing media exposure and marketing efficacy both in Taiwan and Mainland China. According to some statistics, the press conference announcing National Palace Museum's participation in the GAP drew a total of 50 media companies to attend, including all the large TV stations, newspapers, network news, and radio stations, and there are 113 times of news exposures detected in 48 hours. In contrast, the Museum's other press conferences announcing other digital projects in the same year drew merely a total of 25-30 media companies to attend.

VI. Analysis of visitor volumes on National Palace Museum's official website

One of the main purposes of the Museum's participation in the GAP is hoping to increase the art information accessibility for the public and attract foreign visitors to link to the Museum's official site by stimulating their interests in the Museum's artifacts while they are browsing the globally recognized GAP website and reading the Museum's art work narrations, so that the Museum can achieve a better propagation efficacy overseas. Therefore, this study also compares the visitors volumes generated before and after the Museum's participation in the GAP. It was April 2012 when National Palace Museum joined

Table 11 The number of media attending NPM press conferences:
Google Art Project vs. other digital projects in the same year

	The GAP press conference	Press conferences for other digital projects
Number of attending media	50	25~30 (estimated)

Source: Original data from NPM's Information Center

the GAP. One year before joining the GAP, the Museum had visitor volumes that accounted for 2,622,964 visits, in which visitors from the U.S. about 12.11% ; one year after joining the GAP, however, the Museum has already reached a total of 2,710,664 visits, a 0.03 % of growth, in which the visit volumes from U.S. about 22.28%. Even though there was only a slight web traffic boost to NPM website after the NPM joined the GAP, however, the web traffic from the United States had increased significantly (83%). It is evident that after joining the GAP, National Palace Museum has seen the efficacy of its enhanced international visibility, and stronger propagation of its art information. The number of visits a year before and after the Museum's participation in the GAP are shown in Table 12.

In addition, researcher has also discovered that a year after joining the GAP, linking from the Museum's official website outward to the GAP website had reached 3,359 times. However, what's inadequate is the data of website traffic of GAP of the same period - there are only about 5 months of data for the period of 2013/4/21-2013/9/4. Therefore, an account estimates 22,418 visits of NPM’s

Table 12 Visits to NPM official website before and after its joining the GAP

	Total visits to NPM official site	Total visits by visitors from U.S
2008/4/1-2009/3/31	1,797,016	9.66%
2009/4/1-2010/3/31	1,743,944	9.29%
2010/4/1-2011/3/31	2,150,573	12.61%
2011/4/1-2012/3/31	2,622,964	12.11%
2012/4/1-2013/3/31	2,710,664	22.28%
Growth rate compare to one year before joining GAP	0.03 %	83%

Source: Original data from NPM’s web team, and complied by Shao-Chu Wu

GAP platform after a full year of joining the GAP; meanwhile, the annual outward linking from the Museum's official website to the GAP website is about 3,359 times, merely 13.4% of the other way around. This result evidences that National Palace Museum's participation in the GAP has created a win-win situation for the growth of web traffic on both sides - the NPM and the GAP.

Conclusion

The goals and expectations of NPM joining GAP were diverse, by joining the GAP, NPM hoped to promote art information, provide educational resources, increase NPM web traffic, market museum image, elevate international exposure, understand the behavior of web visitors and various other goals, as well as to simulate future website design to be innovative, and develop novel ideas for information services. From the above instance of Web log analysis and various other auxiliary methods, the study had found numerous benefits and trends worth noting after NPM joined GAP:

1. The marketing results of NPM joining GAP were superb with high public support:

   Local Taiwanese citizens had shown a great support on NPM joining GAP, and the domestic news value and exposure were also high, therefore the museum marketing results had been overwhelming positive.

2. Cultural background is still a key element in visitors' decision of visiting NPM web pages on GAP:

   Based on the backgrounds of visitors, despite the majority were from North America, most of the user language was actually Chinese, with the help of data cross-analysis, it also showed that visitors of Chinese language had

visited certain artifacts' pages more frequently than those of English language. It's clear that cultural background determines whether or not visitors will visit NPM web pages on GAP, as well as in-depth browsing of NPM artifacts.

3. It was a win-win situation after NPM joined GAP given that, the web traffic of NPM official website had grown steadily, and NPM had also contributed to the overall GAP web traffic:

   The study indicated that, not only did the NPM web traffic grown continuously one year after joined GAP, but a near 83% increase were also received in U.S.; NPM website also accounted for approximately 3,359 visits to the overall GAP traffic.

4. Mobile devices may not be the best tool for viewing art pieces:

   Data showed that tablet and mobile phone users accounted for a very small visiting rate of NPM web pages on GAP, and the bounce rate was somewhat high. Possible reason may be because while viewing art pieces on smaller screens, users did not experience the kind of comfort and aesthetic from how viewing art pieces should provide, another reason may be related to art and museum lovers are more accustomed to viewing art pieces with bigger screens on their desktops.

5. Based on study results, the key to drawing visitors after NPM joined GAP lies on the popularity of the artifacts provided to GAP:

   Among the artifacts provided to GAP, most of the popular ones are already very well-known among NPM artifacts.

6. The results of NPM joining GAP also indicated that, as museums joined GAP, web traffic could receive a dramatic boost if it was integrated with

other educational resources online and other e-learning websites:

For example, a considerable number of visits from NPM on GAP were directed from a Portland learning website "pps.k12.or.us". This showed that in order to achieve educational purpose of museums joining GAP, the contents should also be integrated with existing educational resources online, or draw educational events by utilize information on GAP.

7. Quality and quantity of the NPM's images on GAP need to be improved in future:

Visitors' feedback also revealed that, some of the NPM content on GAP suffered from poor artifact image quality; and majority of criticism acknowledged that the NPM contents provided to the GAP are far from sufficient.

Although it is important that the NPM may had drawn various visitors through the collaboration with the GAP. However, due to NPM's limited visiting space and large volume of visitors, it is also very valuable that the GAP provides another way for visitors to enjoy NPM artifacts before or after their actual visit.

In sum, based on the analysis of NPM joining GAP, the results had been extremely favorable in the areas of museum marketing and news value; as well as being beneficial to the NPM official website traffic, especially with an increase from U.S. From the visitors behavior observation, analysis were done on visitors' backgrounds, languages and browsing tendencies, it was discovered that cultural background is still the dominant factor in whether or not users visit NPM pages on GAP; Moreover, the study also found that visit volume on mobile devices is relatively low, and artifact popularity was key to visitors' browsing habits, improved results can be made by integrating with educational resources online. Furthermore, regarding to how NPM on GAP can improve in the future,

as well as various problems and short comings pointed out by the comments, the NPM should try to integrate the content on GAP with related domestic or oversea online educational resources, or encourage teachers to utilize resources on GAP to enhance their teaching materials, as methods to increase web traffic. Lastly, NPM should also attempt to replace sub-par quality images in the future, as well as expanding NPM contents on GAP.

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