

## From the Picture Press: An Online Exhibition of the SPH Photographs Collection

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### ABSTRACT

'From the Picture Press: the SPH Photographs Collection' is an online exhibition based on the Singapore Press Holdings (SPH) archive of photographs covering the pre-independence period, i.e., 1950-65. It offers a unique opportunity to take a journey back in time, to experience through these black and white images, before Singapore's rapid modernisation and transformation to become one of the Asia's most affluent and technologically sophisticated city-states. The main aim of this paper is to develop and evaluate an online exhibition system and to find out its usefulness to teachers and students. From the user point of view, they would like to have detailed information about the Singapore including its history to the present. It was noticed that online exhibitions' user interfaces depend on the authoring tools that the institutions used. It was also found that internet is a very convenient medium for the teacher and public to deliver heritage and cultural information. School children are definitely excited over the opportunity to visit the online exhibition at home alongwith their parents. The findings show that teachers liked the online exhibition systems which had lot of cultural heritage information and also felt that it is a way to go forward for knowledge transfer in the future for the children.

**Keywords:** Online exhibitions, history, Singapore

### 1. INTRODUCTION

A picture is worth a thousand words and hence is a powerful tool of communication to direct the ideas, to stir emotion and bring back the experience of the moment captured during that time. Since the number of people using internet increased drastically in Singapore for various purposes, the National Archives of Singapore (NAS) sought to explore the possibilities of technology-based information resources that could enhance the ways in which professionals performed their jobs. By creating online exhibitions they want to break down the traditional walls of an exhibition to create a '24 hours/7 days a week available exhibition' that could cater to different levels of interest and expertise found in the visitors of the exhibition<sup>1</sup>. In contrast to a physical exhibition which is bound by sufficient physical space, the online/virtual exhibition holds limitless data. Online exhibition perceived as a powerful medium to make accessible to the Singapore heritage collections of photographs that are not usually available to the public and probably would not have been feasible in a physical exhibitions.

Since 1980, the NAS has been holding static exhibitions covering a wide range of history and heritage related subjects. The exhibitions are an integral part of the National Heritage Board's (NHB) mission to explore and present Singapore's heritage to the public. They are also an important channel through which vast archival collections are made accessible as packaged, thematic resources for national education and social studies in schools and institutions of higher learning. To keep pace with Singapore's move into the new world of the IT age, and with the current emphasis on creative and continual learning through IT, the NAS is harnessing this new technology to deliver the exhibitions to a wider audience. The NAS and the Nanyang Technological University (NTU), a leading educational institution in Singapore came together and collaboratively developed a few online exhibition to promote Singapore's history and heritage through the internet.

The aim of this project is to develop 'From the picture press: A web-based online exhibition system on the SPH photographs collection', and find out its impact on school teachers and students.

The target audience for the history photographs of Singapore covers a broad spectrum of people including tourists, teacher and young children. Online exhibitions are also useful to a variety of guests, including those who would not traditionally go to museums such as the disabled, elderly, etc. The most important aspect in this exhibition is that remote visitors (people who are not geographically close to the museums) can also visit the online exhibition such as media researcher, conservation scientists, customs officers, university lecturers and students and many people with personal rather than professional or educational interests in history.

### 1.1 Benefits of Online Exhibition

Some benefits of online exhibition are:

- (i) It will contribute to cultural preservation and maintenance of Singapore's historic photographic collection;
- (ii) It will help to develop and participate in online exhibitions locally and globally;
- (iii) Increase public awareness about history of Singapore;
- (iv) Increase public knowledge and understanding of Singaporean's cultures and heritage;
- (v) Attract visitors to museums and archives;
- (vi) Exhibition content can be used for teaching and learning purposes at different levels. This can stimulate visitors to enrich their experience;
- (vii) Visitors to the exhibits are not limited to a particular location. Online exhibitions can be seen by many people, including those who do not go to museums in person;
- (viii) It will act as a test bed for Singapore artists to display their work through online exhibitions; and
- (ix) Introduce new knowledge and skills in the use of technologies and tools for online exhibitions.

### 1.2 Cultural and Heritage Information

Singapore is changing daily at an ever-increasing pace. Contemporary society with its computer chips and mass media dependence will generate an all-embracing international valued system and lifestyle. This inevitable process poses serious challenges to their social values, culture, work and leisure attitudes, family ties, interpersonal relationships and so on. To counteract this, individuals and communities today must consciously improve the awareness and appreciation of their own cultural heritage. Broadly, the cultural heritage may be identified as:

- Landscapes and sites;
- Buildings (architecture);
- Movable objects (artefacts, museum objects);
- Documents (archival documents, literature,

sheet music, still and moving images, sound documents); and

- Abstract concepts.

Cultural heritage information can be seen as the information resulting from several different formats such as:

- Text (catalogues, item history);
- 2-D still images (photographs, drawings);
- 3-D still images; and
- Audio recordings and moving images (film, video, virtual reality).

The major players in cultural heritage information include universities, industrial organisations, broadcasting companies and training centres. The main roles of these institutions are:

(a) Archives deal with:

- historical, evidential, information and research value records having continuous/ long term use; and
- those records including texts (b), manuscripts, photos and audio-visual records.

(b) Museums typically have 2- and 3-D artifacts collections on:

- Art (including contemporary);
- Ethnography (including folk);
- History (including maritime, archaeology, daily life);
- Technique (including railways, industries); and
- Natural history (including palaeontology).

(c) Libraries deal with:

- Current and old books; and
- Cartography and other forms of literature.

(d) Sites and monument agencies have landscapes and structures such as:

- Nature parks (including protected landscapes);
- Archaeological sites (including under water);
- Historical monuments and buildings (including cityscapes); and
- Industrial sites.

(e) Cultural and heritage centres including art cultural centres and government departments, and heritage institutions or agencies.

(f) Documentation centres mainly collect, organise and disseminate cultural information such as the ASEAN documentation centres. Universities have their own museums, libraries and archives which are used for teaching and research purposes.

Online exhibitions are being used as a flexible and modern tool for delivering heritage information to the children and public. Online exhibition offer children access to a variety of information sources and give an opportunity to them to contribute additional information from their personal experience<sup>2</sup>. Much effort has been done in encoding text, still images, audio recordings and moving images in digital form with the majority of information made available as electronic data archives.

## 2. REQUIREMENT ANALYSIS

Requirement analysis involves end users and system designers interacting in an effort to recognise and specify the data and information needed to develop a web-based online exhibition system. Proper identification of user's information needs, prior to the design process, lead to developing successful system and also allows for an early correction of errors while the cost of correction is lower. In this case, a requirement gathering study was not conducted because an exhasutive survey was already done so those results were used in developing of this online exhibition<sup>3</sup>. In that study, a total of 77 users were surveyed who were in their mid-to-late-20s and graduated with bachelor's degree. The majority of them were IT professionals and a few librarians. From the survey, it was noticed that users would like a textual site with a moderate amount of graphics and interactivity. Based on these requirements, a decision was taken to incorporate a content description (metadata) of historical photographs so that user can navigate around the website, read the information and get better understanding about the county during those days. Regarding to various media types to be added, 83 % of the respondents considered images over other media elements however, more than half of them showed interest for animation 60 %. They felt that too much animations even hard to use and would make the screen layout confusing.

From the system's perspective, users preferred brief description with additional links to more detailed information. Accordingly, project design was carried out where user can click on the thumbnail images to show the large size and high quality image and its catalogue record button will further provide more detailed information about that image. Users agreed that online exhibitions have educational value that can promote awareness of the country's culture and heritage so that students can access to archives materials for their social studies projects in secondary schools. This survey showed that 80 % of the respondents requested that they want photographs and information on historic sites. In view of this, this project covered all the photographs

covered during the period (i.e. 1950 to 1965), pre-independence Singapore. Since most 94 % of them stressed the need for a search engine for an effective information retrieval from the website, a search engine was decided to provide to search the content of the online exhibition for the users.

## 3. METHODOLOGY

Development of online exhibition system involves a sequence of phases of a system's life cycle, which includes: requirement analysis, design, implementation and maintenance<sup>4</sup>. Requirement analysis enables the web designer to specify the web-based information function and performance, and establish the design constraints that the web-based system must meet, subsequently to refine the information system allocation and build models of the process, data, and behavioural domains.

Design provides us the representations of web-based information system that can be assessed for quality and thus transforms the user requirements into system's design specifications. For developing this system, PastPerfect Museum Ver 3.0 and Virtual Exhibit software tools were selected to implement the online exhibition. From the literature review, it is found that this software is able to handle images and metadata in a much better way. Though there are many better software but they are very expensive and needs lot of experience to use and are also not locally available. Virtual Exhibit is a moderately priced software (\$1314.00) amongst the other developing tools. Moreover, this authoring tool is suitable for small museums and archives as compared to other popular tools such as KE Emu, Contentdm and Multi Mimsy, which are meant for developing large size systems.

### 3.1 System Development Method

Prototyping model was used for the development of this online exhibition. One of the main reasons for this is unfamiliarity of the system's functions and capabilities. In this case, a prototype of web-based online exhibition system was built using Macromedia's Dreamweaver and tested with real users. Later, the same system design was implemented in virtual exhibition system and then tested with real users.

Due to time constraints, the evolutionary prototype is discarded and in this case, the actual web-based system is seen as evolving from a very limited initial version to its final release. The evolutionary prototyping also will fit in well with the modifications that must be made to the system which arise during the operation and maintenance activities of its life cycle. This prototype will serve as a benchmark to evaluate the completed system.

### 3.2 System Evaluation Method

Evaluation is an integral part of the design and should take place throughout the design life cycle with the aim to test the functionality and usability of the design and to identify and rectify any problem<sup>5</sup>. There are four possible approaches for evaluating design:

- (a) Cognitive walkthrough
- (b) Heuristic evaluation
- (c) Review-based evaluation, and
- (d) Model-based evaluation

In the evaluation of the online exhibition system, the heuristic evaluation technique is used. The heuristic evaluation technique is used to evaluate the design phase, while questionnaire technique is used to evaluate the implemented system<sup>5</sup>. Heuristic evaluation was selected because it is best used for evaluating early stages of design and it is easier to fix lot of the usability problems that are identified. To do this, a set of storyboards giving an overview of the system to a fully functional system is designed. Evaluators independently critique a web-based system to come up with potential usability problems. Most importantly the designer does not need to worry about the heuristics used for the design of the system, because several evaluators independently critiqued system to come up with potential usability problems. Once all of the problems are collected, the designer can determine which ones are the most important and then rectifying them in the system.

After implementation to evaluate the usability of a web-based online exhibition system, survey method and questionnaire tool is used. The benefits of using questionnaires are that they can get user's viewpoint directly and may reveal issues that have not been considered by the designer. In addition, questionnaires are relatively cheap and simple to administer. It can be used to reach out to wider subject groups and can be analysed more rigorously during requirements capture, task analysis and evaluation. Unstructured interviews are not used because it may waste respondents and interviewer's time. Furthermore, respondent's bias in questions or reporting of results is more likely.

The validity of the findings depends on the sample selected and also on successfully obtaining data from those selected for study. Individually one has to follow up those who are non-responsive to the initial contact. The rule of thumb for survey is to gather data from at least 80 % of those sampled<sup>6</sup>. Usability tests may include both performance and preference testing. For the performance testing, we observed how easily participants performed tasks. For the preference testing, an opinion about the

interface, functionality, and workflow was collected. The survey covers both objective and subjective questions to get broader picture from the users. To collect qualitative data, the project used a combination of protocol analysis (also called 'thinking aloud' protocol) and observations of usability. While thinking aloud, participants vocalise their thoughts and impressions as they perform the tasks. To collect quantitative data, participants' recorded their views on the questionnaire on various aspects of the online exhibition system including its interface design, usability and overall design of the system. The final evaluation survey used seven-point Likert-scale questionnaires that enable the researcher to quantify participants' preferences.

## 4. DESIGN AND DEVELOPMENT OF ONLINE EXHIBITION

The design and development of online exhibitions for archives is made to be dynamic and encourages explorations; it should respond differently to different viewers. If the visitor explores, the exhibition will respond accordingly. While the visitors do not interact with the material, the exhibition acts autonomously to bring an array of images to the viewer's attention.

### 4.1 Design

Planning a websites requires a grasp of the essential areas including: Content, navigation and the layout of appearance<sup>7</sup>. Content generally need to be considered first, navigation second and appearance last. Based on the users requirement, with the help of Macromedia Dreamweaver online exhibition, prototype was made and presented to the real users including NAS staff who are involved in organising both physical and online exhibitions. After getting their approval on the design of the online exhibition, actual system was developed using professional authoring tools.

### 4.2 Development

The development of the online exhibition system was successfully completed and implemented on Information Studies Lab Web Server at <http://islab.sas.ntu.edu.sg:8000/vewebiste/index.htm>. The users suggested some enhancements:

- (i) Appropriate colour may be applied to text buttons;
- (ii) Provide flash animation and embed audio to the website;
- (iii) Embed audio-video clips to make the website more interesting;
- (iv) Provide other related URLs to particular pictures on the screen;



- (v) Use of thumbnail pictures to reduce the down loading time;
- (vi) Need to have an advanced search tool; and
- (vii) The icons of the previous and next buttons may be changed.

All these features were decided to implement in the revised online exhibition website. Additional features including browse option was added into the 'Search page' and 'convert all the hypertext' to navigation buttons.

Before the start of the development of online exhibition website, PastPerfect Museum Software was used to record all metadata records with a separate catalogue screen designed specifically for each photograph. The photo screen was used to record metadata each item for collection of the photographs including the object type, photographer, place, people, description, event, etc. The following are the steps involved in the registration, cataloguing and posting onto the website:

- (i) *Registration Object ID*: It is the process of developing and maintaining an immediate, brief, and permanent means of identifying an object.
- (ii) *Data Entry*: A detailed description of the object in the accession list is catalogued and compiled as per the collection items.
- (iii) *Cataloguing of Photographs*: All photos must be marked with their object ID number. Object name based on the Library of Congress Thesaurus for Graphical Materials (LCT GM) – Subject Terms, or LCT GM 1. This subject file provides terms for subject indexing of pictorial materials, particularly historic photographs. The object name used in the project images was 'Print and Photographic'.
- (iv) *Detailed Information*: It included photograph's description, early date, negative number, photographer, place, event, copyright, search term, and picture number.
- (v) *Digital Image Management*: PastPerfect software is equipped with a digital imaging management option. 162 photographs were attached for each metadata record.
- (vi) *Virtual Exhibit Software*: In the final process, Virtual Exhibit software was used to convert metadata records and images stored in PastPerfect to *html* for posting onto the exhibition website.

The limitation of Virtual Exhibit software is lack of excellent screen design capabilities for user interface, hence automatically generated web pages were customised using FrontPage 2000 and Macromedia Dreamweaver 4 to enhance the look and feel of the interface.

#### 4.2.1 Interface Design Issue

The online exhibition system is hosted on the web server Windows platform available in the Information Studies Laboratory. The website was decided to design at 800x600 pixels resolution and has a moderately interactive interface that involves text and still images. Currently, the online exhibition had more than 160 still images.

#### 4.2.2 Organisation of Information

In the online exhibition, all the SPH photographs collection was organised into three main components:

- (i) Panel page,
- (ii) Catalogue record page, and
- (iii) Image page

Panel 1 contained 29 catalogue records; Panel 2 contained 5 catalogue records; Panel 3 contained 18 catalogue records; Panel 4 contained 8 catalogue records; Panel 5 contained 9 catalogue records; Panel 6 contained 6 catalogue records; Panel 7 contained 19 catalogue records; Panel 8 contained 13 catalogue records; Panel 9 contained 13 catalogue records; Panel 10 contained 8 catalogue records and Panel 11 contained 32 catalogue records. Each record has both image and metadata fields to describe the image.

The interaction sequence in the online exhibition is shown in Fig. 1. For security reasons, the website does not included sensitive data fields in the catalogue content. The following metadata fields were included: copyright, credit line, description, early date, event, negative no., object Id, object name, people, photographer, place, search terms, source, sub-category and the picture number.

Information search page using client-side search engine, written in Java Script, which allow visitors to conduct two types of searches:

- (i) Entire exhibition site, and
- (ii) Individual exhibit (Fig. 2).

While there is no limit to the number of catalogue pages that can be included in an exhibit however, the 'Search engine' does have some limitations. The speed at which the 'Search page' displays depends on the number of records and also the speed of the visitor's internet connection. For visitors of low speed internet connections, a search page with a large number of catalogue records may slow down the process however, after implementing a server-side search engine this problem was solved. The search engine can search each of the following field lists: Credit line, description, early date, event, negative number, object id, object name, people, photographer, place and search terms.

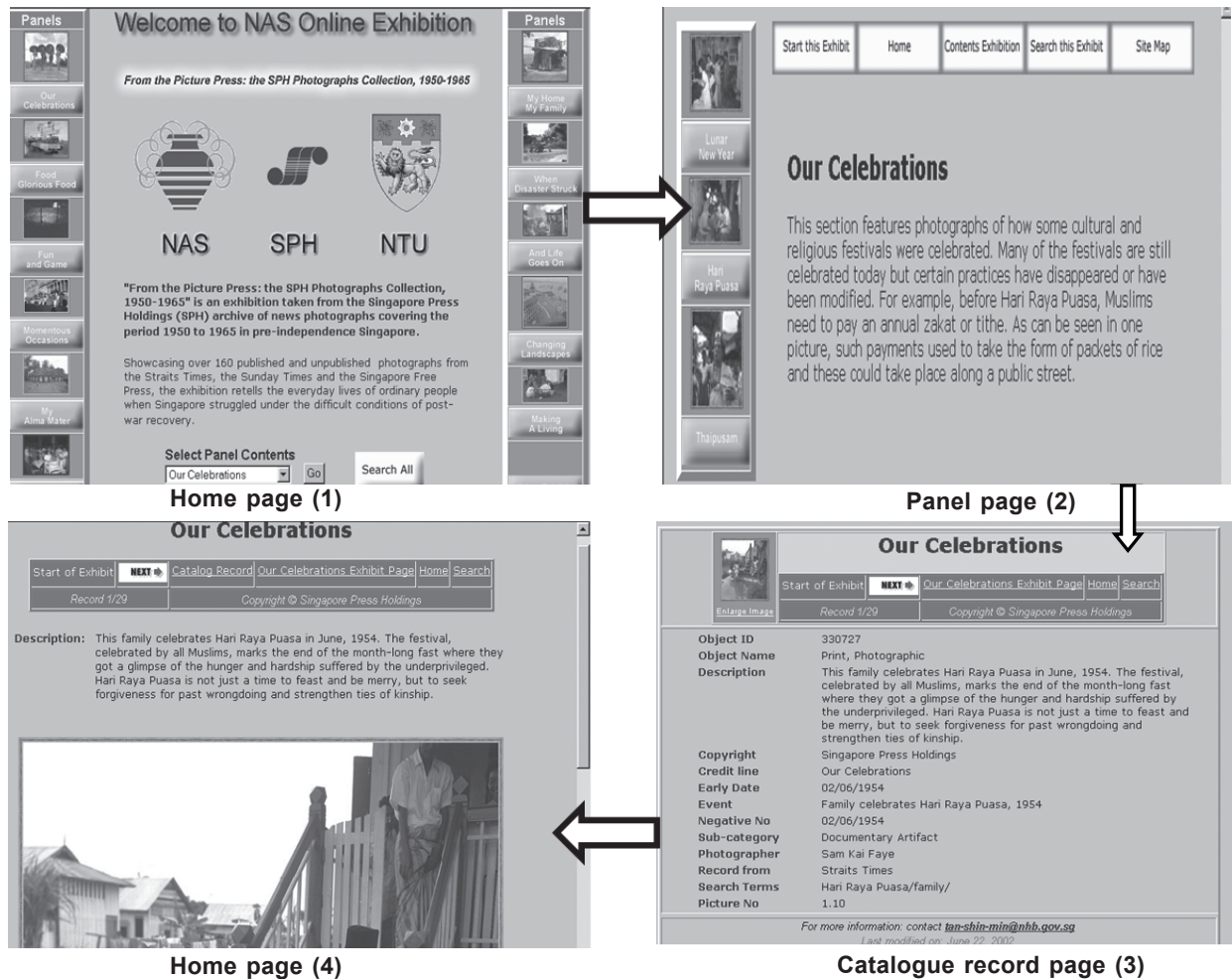


Figure 1. Interaction flow in the online exhibition.

Search results will list all the keywords specified in the search engine as shown in Fig. 2. If the keyword does not match, the search result will display a message '0 matching record found'. The search output will show the object name and the thumbnail images along with hyperlinks to the corresponding pages. The keyword will be highlighted in bold on the search results output page.

#### 4.2.3 Exhibition Structure

This website was well structured into panels/sections based on its photo collections, metadata of images to find information about an object, collection or subject. In order to avoid confusing and cluttering on the home page, the online exhibition was designed with balanced number of links on the home page to give viewer an idea of what the site contains, and making sure the website have required information only. This website has 12 text button links to 11 panels, the rest were the external links making a total of 15 however, the page does not look cluttered.

The 'home page' has 'eleven panel sites' and leads to 'catalogue record page'. The following are the panels and their subject coverage in the exhibition:

- (i) *Our Celebration*: It provides all the photographs of how the cultural and religious festivals were celebrated during that period. This section contained 29 photographs and their corresponding thumbnail images.
- (ii) *Food Glorious Food*: This section explained how during the difficult days of the 1950s and 1960s, the locals turned into hawking to earn their living. Rows of roadside stalls were lined up on the streets outside shop houses, offering a variety of delectable dishes to famished passers-by. This section contained 5 photographs and their thumbnail images.
- (iii) *Fun and Games*: This panel provides a brief account of ordinary folks indulged in a variety of recreational activities. Many took part in 'Sea Sports' which was organised annually for sea-faring people of Singapore and its surrounding islands. It contained 18 photographs and their thumbnail images.
- (iv) *Momentous Occasions*: Covers the specific collection of information about the residents of pre-independent Singapore who were not politically unified. Many pledged allegiance to the King or Queen of England while others

## Information Searching

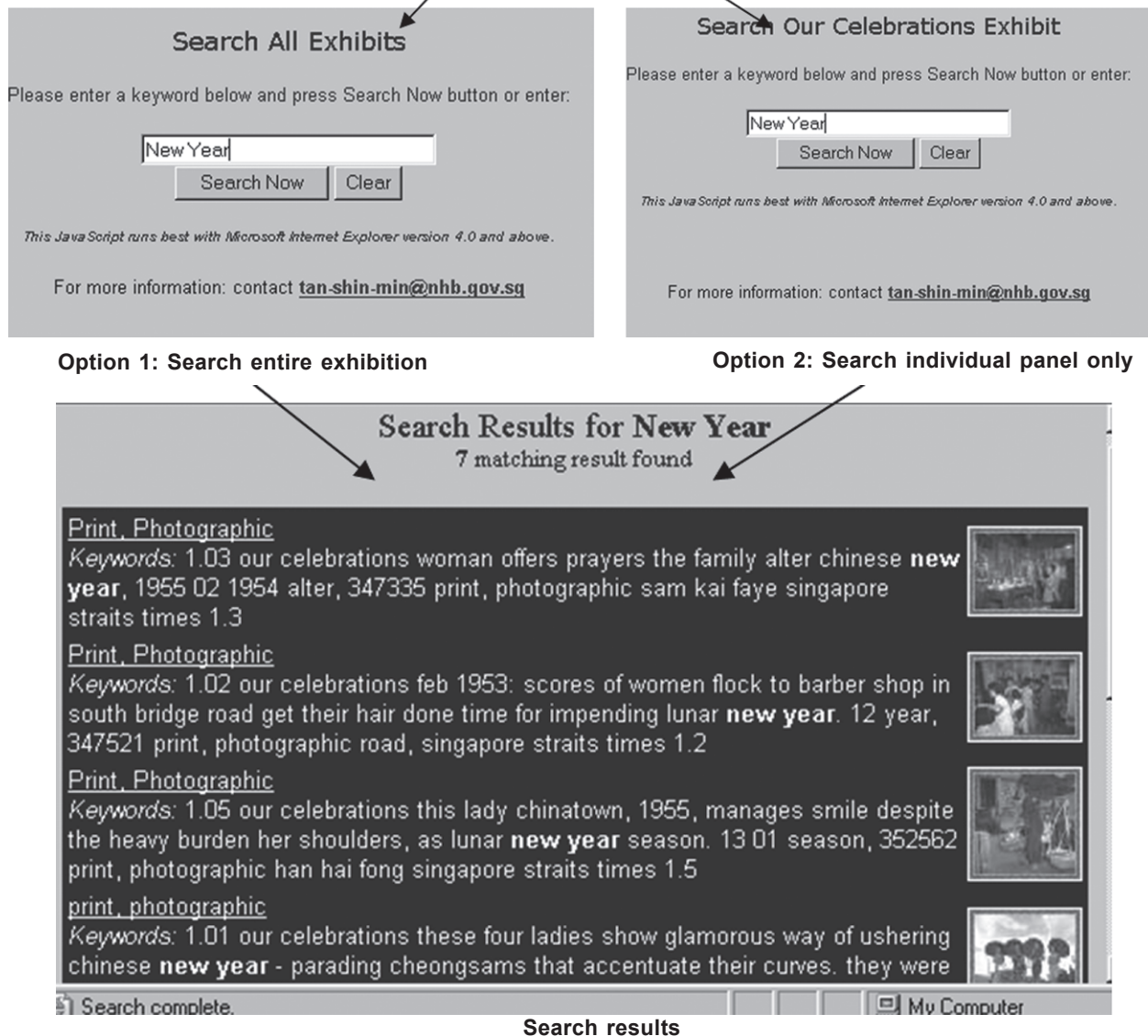


Figure 2. Information searching in the online exhibition.

maintained links with the countries they had come from. It contained 8 photographs and their thumbnail images.

- (v) *My Alma Mater*: A section presented how the students learned reading, writing and arithmetic in schools. They also took part in school activities and forged links with their alma mater. This site contained 9 photographs and their thumbnail images.
- (vi) *A Helping Hand*: It covers existing services provided by voluntary bodies. The bodies dealt with post-war hardships by setting-up of restaurants, children's feeding centres and to provide healthcare services. It contained 6 photographs and their thumbnail images.
- (vii) *My Home, My Family*: presents the information during the post-war years in which Singapore

experienced rapid population growth amidst poverty, leading to acute housing shortage. Shophouse owners would partition rooms into tiny, windowless cubicles and rent them out to families of eight or more. Furthermore, the lack of sanitation in the dwellings resulted in the rapid spread of diseases, especially tuberculosis during that period. This panel contained a total of 19 photographs and their thumbnail images.

- (viii) *When Disaster Struck*: Presented an account on how Singapore was prone to major disasters both natural and created by men. It contained 13 photographs and their thumbnail images.
- (ix) *And Life Goes On*: Section features the turbulent times in the history of Singapore. Many familiar and often violent images of these episodes were seen, such as the Maria Hertogh riots,



the Hock Lee bus strikes and the unrest of Chinese school students. This section contained 13 photographs and their thumbnail images.

- (x) *Changing Landscapes*: Information on changing Singapore, as it is now an island dotted with towering skyscrapers and lined with busy highways – how it transformed into a modern metropolis.
- (xi) *Making A Living*: Features many people with little or no education look a variety of jobs, mainly by making a living on the streets. They earned barely enough for themselves and their families. This section contained 32 photographs and their thumbnail images.

#### 4.2.4 Screen Layout

The home page of the online exhibition contained 11 exhibits or panels, each panel had varying number of associated records. Each panel also has its own 'Search page' and a 'Contents Exhibition page' (Table of Contents). These pages can be selected from the menu bar at the top of the exhibit page. Unlike the search page selected from the home page, which will search the entire website, the exhibit search page allows the visitors to search that exhibit only (Fig. 3).

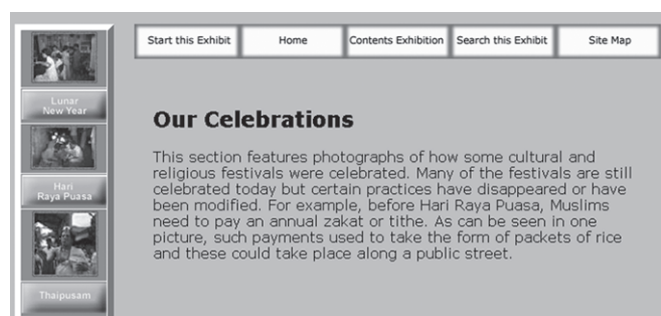


Figure 3. Panel page of online exhibition.

Each panel layout of the screen is made out of the following components:

- (i) *Thumbnail Images*: Each panel page displays three sample images from the exhibition along with captions on the panel main page;
- (ii) *Description*: A brief description of text appears just below the banner and to the right of the sample images; and
- (iii) *Footer*: The footer text font face is Arial of font size is 2.

The Exhibition contents (i.e., table of contents) is a list of all records included in an exhibition. Visitors can click on the column headers to change and sort order or click on the underlined ID# to jump to the corresponding catalogue record page. The hyperlinks at the bottom of the screen return back to the panel page, or access the search page (Fig. 4).

A separate webpage is created for each catalogue record which includes the following components:

- (i) *Hyperlinks*: The image with a border is hyperlinked as well as the text and buttons navigating to previous and next records.
- (ii) *Menu Bar*: A title appears on the catalogue record page with a font face Verdana, point size 5 and bold in navy colour.
- (iii) *Metadata Fields*: Used the font face Verdana with 12 point size. The title field is in navy colour and the metadata is in dark colour.
- (iv) *Copyright Statement*: The statement used Arial Font face with size of 10 points and is in Aqua colour.
- (v) *Footer*: The footer text font face is Arial with font size 2.

Consistency is very important in the 'look and feel' of the online exhibition system. It includes the

Food Glorious Food Sorted by Id#					
To view a record, click on its Id#. To change the sort order click on the table heading.					
Id#	Name	Title	Creator	Place	Date
<a href="#">385428</a>	Print, Photographic			Chinatown, Singapore	30/06/1953
<a href="#">406587</a>	Print, Photographic		Mak Kian Seng	National Museum, Singapore	18/03/1961
<a href="#">415113</a>	Print, Photographic			Cecil Street, Singapore	02/02/1950
<a href="#">416256</a>	Print, Photographic			Singapore	23/08/1951
<a href="#">416284</a>	Print, Photographic			Dhoby Ghaut Green, Singapore	07/09/1952

[Home](#)
[Food Glorious Food Exhibit Page](#)
[Search this Exhibit](#)

For more information: contact [tan-skin-min@nhb.gov.sg](mailto:tan-skin-min@nhb.gov.sg)

Figure 4. Contents of an exhibition.



colours, layout and fonts, and the use of consistent buttons throughout the website. The NAS online exhibition had a mixed balance of text and pictures however, it is very difficult to cater to the entire satisfaction of the users.

#### 4.2.5 Navigation

The online exhibition system website follows the 'three click rule', which means that a visitor is able to get from the home page to the desired item in three clicks. In addition to that, the website made very good use of graphical aids (buttons) to navigate around the exhibition. Buttons were used because they help the visitor to speed up movement around screens as well as improves the look of a page, especially popular among younger visitors<sup>7</sup>.

This website employed both linear and nonlinear navigation patterns; the linear navigation allows the visitor to follow navigation in the exhibition by clicking the Panel → Record → Image, using combination of 'next' and 'previous' links (Fig. 5). Nonlinear navigation is used to facilitate the casual and impulsive browsing which is efficient for cross-referencing. This website had text with many cross-referencing hyperlinks, and entire exhibition is having consistent section headings. The use of the thumbnail for each photograph is visual focused on the page. Besides that, the catalogue record page also provides the number of records in that panel e.g. 1 of 30 records along with links to each page.

#### 4.2.6 Content Coverage

Dublin Core metadata standard provides card catalogue-like definitions for defining the properties of objects, documents or services for web-based

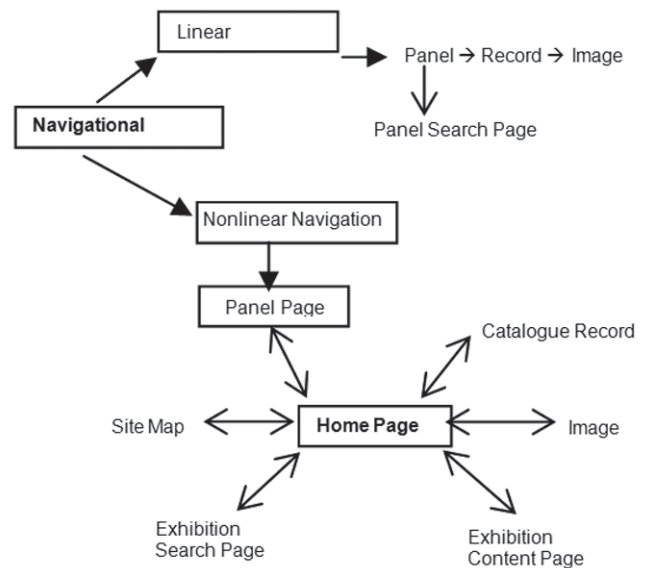


Figure 5. Navigational scheme.

resource systems. Metadata is widely used outside libraries including archives, museums and for document and data management in companies and research institutions. The reason for creating metadata is normally to improve the possibilities of document retrieval (i.e. the search precision) and indexing to support control and management of collections<sup>8</sup>. For the purpose of this project, PastPerfect Catalogue software and Dublin Core ver 1.1 were used to catalogue photographs after customising some of its elements to suit users needs. The customised contents format of the metadata fields are shown in Fig. 6.

The most important aspects in the online exhibition system is providing detailed contents of both textual and visual objects. A detailed metadata is provided describing the images to explain to the visitors why

<b>Object ID</b>	347608
<b>Object Name</b>	print, photographic
<b>Description</b>	These four ladies show the glamorous way of ushering in the Chinese New Year - parading the new cheongsams that accentuate their curves. They were strolling down the Esplanade, 1958
<b>Copyright</b>	Singapore Press Holdings
<b>Credit line</b>	Our Celebrations
<b>Early Date</b>	14/02/1958
<b>Event</b>	Chinese New Year, 1958
<b>Negative No</b>	14/02/1958
<b>Sub-category</b>	Documentary Artifact
<b>People</b>	Trixie Lee/Doreen Bligh/Daisy Szeto/Frieda Chiang/
<b>Photographer</b>	Han Hai Fong
<b>Place</b>	Singapore
<b>Record from</b>	Straits Times
<b>Search Terms</b>	Esplanade/Chinese New Year/Cheongsams/
<b>Picture No</b>	1.1

Figure 6. Contents format.

and what events occurred during the particular period. It can directly provide some connection to visitor's everyday life and knowledge. It is useful to include references and interesting links, especially if the visitors are students, who want help in doing further research. At this moment due to time constraints, this feature was not implemented and left for phase 2 of its development. To enhance the uniqueness of the online exhibition, it included links to other external sites.

#### 4.2.7 Implementation

After completing the design and development of the online exhibition, it was being hosted on two servers of Information Studies Lab and their URLs are: (a) <http://islab2.sas.ntu.edu.sg/8000/vewebiste/index.htm> and (b) <http://islab.sas.ntu.edu.sg/8000/vewebiste/index.htm>.

Some of the system efficiency tests were performed on the exhibition system by the designer and users during the development stage to keep the errors at a minimum. Due to time constraints, a lot of features have not been implemented in the prototype system, before releasing for evaluation. However, browsing images, converting all the hypertext to buttons; site map, help page, etc., were implemented during the support phase.

### 5. EVALUATION OF ONLINE EXHIBITION

The evaluation of this online exhibition was carried out through survey method using questionnaire tool. A total of 79 participants comprising of Diploma students, from Informatics Computer School, NTU undergraduates and Singapore public. The evaluation was carried out at the NTU Library and at the Informatics Computer School where both full-time and part-time diploma students participate. However, due to time constraints, all the staffs of NAS and SPH did not participate in the evaluation. The questionnaire covered the respondents' profile, design, content and organisation of information, navigation, system capabilities, information searching and the overall design of the online exhibition. The purpose of this evaluation was to find out the strengths and weaknesses in the design of the online exhibition. The total evaluation exercise was completed in two weeks in April 2002. The data is fed into computer using MS Excel software and analysed. Based on the evaluation results, the developed system's design was modified to meet to the users' needs.

#### 5.1 Personal Profile

Of the total, 64 percent of them were in their mid-twenties, with males outnumbering to females by 23 numbers (65 % males versus 35 % females). thirty-nine percent were NTU undergraduates and

working adults, thirty-seven percent of respondents were studying Diploma courses at Informatics and the remaining (11 %) were graduate students and public. Less than half (41 %) had 4 to 6 years, over a fifth (22 %) had more than 7 years and the remaining (37 %) had 1-3 years prior computer experience. Most of the participants of this evaluation were students and a small percentage of them were IT trainers, lecturers and officers working in various departments. Survey sample consists of a good mix of different backgrounds of professions, students and public so that they could provide valuable feedback on the online exhibition system from different perspectives. Students are good in pointing out the problems in design, attractiveness while the technical IT people are good in pointing out the technical efficiency on delivery of the online exhibition system. The staffs of NAS and SPH, who are regular users of this system suggested a few improvements to meet the users' needs. The mean age of participants was 20-25 years. The youngest respondent who evaluated the system was 17 years old. In this case, primary and secondary school students, poly students and public were allowed to access and evaluate the exhibition.

#### 5.2 Interface Design

The second part of the survey deals with interface design characteristics such as the text readability, appropriate use of colours and buttons, visual consistency and sequencing of screens, attractiveness of exhibition, pleasant interface, user friendliness, ease of use and learning of the exhibition and the gaps in the information provided and its level of understanding (Table 1). More than half 54 percent of the respondents were of the opinion that the text size chosen were readable and clear. The appropriate use of colour on the website was generally satisfactory to very good 89 percent however, 11 percent of the respondents felt that the background colour was pale and plain and the overall colour was not striking enough.

Most (96 %) of them felt that the buttons used were acceptable because they were indicating their functions when the mouse moves over the button. However, the yellow colour used to the text buttons was not acceptable and made the text difficult to read. So, the text colour of website was changed later according to the user's preferences. The online exhibition had a good visual consistency and sequencing of screens, all the colours and layouts of the screens used in the website was generally consistent.

The majority (88 %) of the respondents felt that the site was attractive and acceptable because minimum required information was provided on the screen which made the screen please in appearance.

**Table 1. Interface design evaluation results**

Design Issue	Rating	Very Poor	Poor	Acceptable	Good	Very Good
Text readability	-	1 %	40 %	54 %	5 %	
Appropriate use of colour	3 %	8 %	39 %	40 %	10 %	
Appropriate use of button	1 %	3 %	44 %	42 %	10 %	
Visual consistency and sequencing of screens	-	6 %	35 %	51 %	8 %	
Attractiveness of exhibition	3 %	9 %	47 %	34 %	7 %	
Interface is pleasant	-	5 %	34 %	55 %	6 %	
User friendliness of Exhibition	-	5 %	35 %	54 %	6 %	
Ease of use of Exhibition	-	6 %	39 %	42 %	13 %	
Ease of learning the exhibition	1 %	3 %	33 %	53 %	10 %	
Information provided sufficient	-	10 %	41 %	43 %	6 %	
Information easy to understand	-	5 %	37 %	52 %	6 %	

A few respondents suggested to provide some flash animation in appropriate places and also to embed audio clips to the website so the sites will look more attractive.

95 % respondents found the screen interface pleasant and user-friendly due to the use of cool colour scheme of the backgrounds and simplicity maintained in the design. Due to its simple screen design and good navigational links, 94 % respondents felt that the exhibition system is easy to use and learn (96 %). However, a few (10 %) felt that the information provided was not sufficient to describe the panels but that indirectly affects the layout and attractiveness of the design of an exhibition. On the other hand, the information was easy to understand and brief enough to describe the photographs in the exhibition.

Overall the look and feel of the exhibition seemed to be effective but a few of the respondents made suggestions to improve the visual appearance of exhibition. Some visitors felt that the exhibition website is a bit simple though it has a friendly and pleasant interface. According to the screen design Huristics, the length of the scrolling filed is kept 1.5 screen size so that the visitors are not forced to continuously scroll down or up to reach the required information. In general, dark text on light backgrounds is generally more readable than light on dark. Verdana font with 10 points size used in the exhibition website was large enough to read and legible on all platforms<sup>9</sup>. Most of the contents consisted of black and white photographs, so to compensate that backgrounds of the screens were created in sober colours. About half of the respondents felt that the use of colours were appropriate. During the evaluation, some students pointed out that the rainbow effects at the home page 'looked colourful and fun, but they were too bright, and gave a childish look'.

The criteria of linking appropriate external or valuable sites, the home page contains the external links to NAS, SPH, NTU and other exhibit websites. However, the feedback was generally satisfactory, with 37 % of the respondents agreeing that the links were somewhat relevant and useful to them. The majority (84 %) of respondents were happy with the content coverage but a few (16 %) wanted more detailed information but that may put off the general public and casual visitors who may not want exhaustive information on these events. To satisfy them an extra link may be provided in the next phase by providing detailed information.

#### 5.4 Navigation

The navigation criteria used were ease of navigation from one screen to another, ease of tracking back to the records, helpful navigational aids and an effort to reduce the problems encountered by the visitors during their navigation. The majority of the respondents (63 %) found that the navigation links were easy to use and for another quarter (27 %) acceptable who were able to return to the previous record easily. The 'Previous' and 'Next' buttons are the main navigational aids to performed this task however, some of the respondents felt that the font face of the text buttons were not so clear due to text shadowing effect. Hence, these two buttons were later changed as per respondent's suggestions. The whole design was simple and intuitive, so the respondents felt that 'Help pages' were not necessary to use the website.

More than half of respondents (57 %) found that the buttons are helpful and sufficient. Some of the respondents pointed out that shape of the buttons was not attractive and it would be more helpful if all the text buttons are changed to graphic buttons. In general, the respondents did not encounter any problems while using the online



**Table 2. Content coverage vs. organisation**

Content	Rating	Very Poor	Poor	Acceptable	Good	Very Good
Organisation of information	-		5 %	48 %	43 %	4 %
Content coverage	-		16 %	40 %	41 %	3 %
Content	Rating	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
Ease to find information		10 %	34 %	50 %	6 %	-
Appropriate link	-		9 %	47 %	37 %	7 %
Link to related valuable sites	-		9 %	47 %	37 %	7 %

exhibition system except the thumbnail images were not so clear. The consistency within the website facilitates navigability and overall understanding of the information presented.

### 5.5 System Capabilities

Regarding the system capabilities, the respondents felt that the loadings of image pages are fast and acceptable. This is because both the NTU Library<sup>1</sup> and Informatics Computer School were having high bandwidth Internet connection. However, the respondents with a modem of 56 kbps had encountered some problems of slower down loading of the images which led them to frustration. In general, they felt the system is still reliable (86 %) though the speed of images downloading a bit slow for the 56 kbps users.

A good website should avoid unnecessarily increasing its loading time for images and other content. For this reason, the website was designed using thumbnail images to avoid the longer downing loading time. If the visitors are interested to view the actual image, they can click on the thumbnails to see enlarged pictures. The respondents felt that the loadings of pages with high resolution and large size images are fast enough and reliable.

### 5.6 Information Searching

Most (95 %) of the respondents agreed that the existing search engine is good enough for their work. They were also happy with the display of search results given a choice for the visitor to click on the images or thesaurus. At the same time, the keywords were also highlighted in the text results. Only 5 % respondents felt that search engine need to include more search options. Some respondent felt that the search text box should be provided on the home page and the visitors can then search

directly. Though this is not really a problem for designers but home page interface will not look simple and may result into confusion.

Overall, the photographs, thumbnails and keywords were able to search by the search engine, so the users were satisfactory (Table 3). This is because the search terms or keywords are provided in the metadata fields, so that visitors need not worry about the keywords used for the search. The keywords were common terms used by the Singaporeans in their daily life. However, some respondents were confused about the 'Search All' and 'Search Individual Panel' so the same was explained in the 'help page'. There are three major tools for accessing specific information on website: Site map, search engine, and inverted index. Generally, a website with huge volume of information should provide all three searching tools, however, 'site map' may be an easy way to use amongst these three tools. In this project, all these three searching tools were included to facilitate better information searching. So 95 % respondents agreed that the search engine was good enough and were happy with the display of search results. Browsing facility is also available if the visitors do not know the keywords. All these facilities are available on the home page to help the visitors to find out the information in the exhibition. In addition to that, 'Help page' is available, if any visitor encounters any problems however, survey results shows that people did not face any difficulties while using this system.

### 5.7 Overall Design

One of the limitations of this survey was not covering good sample size postgraduate students (11 %) because the questionnaire was sent through email and the response rate was poor from that group. The respondents felt that the design is simple to use and the user interface is attractive

**Table 3. Information searching**

Information search	Very poor	Poor	Acceptable	Good	Very good
Photograph	1 %	4 %	46 %	40 %	9 %
Thumbnail	1 %	10 %	32 %	50 %	7 %
Keyword	1 %	5 %	46 %	43 %	5 %

with the cool colour backgrounds. Overall design of the online exhibition was satisfactory however, 42 % of the respondents felt the uniqueness and 49 % of respondents felt that the online exhibition met their expectations (Table 4).

learning skills. It was found that this exhibition inculcated a sense of critical appreciation among school students towards the aesthetic values of a diversified culture of Singapore.

**Table 4. Overall design**

Rating System Design	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
Uniqueness of design	6 %	12 %	40 %	36 %	6 %
Met my expectation	3 %	13 %	35 %	36 %	13 %

## 6. IMPACT ON STUDENTS AND TEACHERS

The online exhibition is particularly useful as a part of the education program for school children and teachers. Teachers found useful links to the online exhibition as part of the teaching material or could be integrated with other teaching activities. Using the online exhibition, teachers can assess the students' competencies and knowledge at different levels. The SPH photograph collection online exhibition is basically divided into eleven panel sites that are easy to navigate. For example, 'In the My Home, My Family panel', students have the opportunity to experience and gain an insight on how Singapore has transformed from poor nation to one of the Asia's most affluent and technologically sophisticated nation. Furthermore, students can study how the historical events over 50 years have showcased about modern Singapore. There are over 160 photographs illustrating the various facets of life in Singapore accompanied with the transcripts that make it easier for students to learn about these events. The learning outcome can be assessed on different levels of difficulty based on the student's level of education. For example, at the primary school level, the exhibition can be presented in an adventure game or comic book with fascinating heritage photographs. At the secondary school level, the teacher can use the online exhibition to create students' awareness on Singapore's heritage and culture. At the tertiary level, the historical materials can be used as part of the students' research projects. Students thus can locate information about the consequences as well as witness the actors involved in those historical events.

All teachers felt that the online exhibition is an important mode to transfer knowledge to their children in today's society. They are of the opinion that the online exhibitions can stimulate and facilitate students' learning. The collaboration between NAS and NTU on developing online exhibitions definitely generated a great impact on the students and teachers in secondary schools. The teachers felt that the implementation of online exhibition and associated activities would broaden their student's

## 7. CONCLUSIONS

It was noticed that online exhibitions' user interfaces depend on the tools that the institutions used. Most of the interfaces were adaptive and there are different methods for retrieving the same information depending on user's preferences. There is a provision for the users to determine fields that are displayed in query and retrieval screens. This feature is good because most of the visitors range from school children to advanced users, so they can select the fields they like to use for querying. If the online exhibition is used by the young primary school children, it is unlikely a teacher would want them to see the full text displayed with images. The teacher might prefer children to search using visual cues rather than completing a database search. It was found that not many or none of the online exhibition system were using natural language search capabilities<sup>10</sup>. Perhaps, the most natural way to learn about history is to ask a question to the system. But none of the systems are able to allow visitors to ask questions. Another finding is that the online exhibition user interfaces are slowly moving towards incorporating virtual reality and flash animation content to attract their visitors. The exhibitions are moving from static hypertext environment to animated interface with full of media and virtual environments.

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