

# DIGITISATION OF THE NATIONAL COLLECTION: CHALLENGES AND OPPORTUNITIES

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## **The National Collection**

Cultural heritage is an important capital for a society. This is because “culture and arts benefit society in many ways .... They give a nation its unique character and provide the much needed social bond to hold its people together. They add to the vitality of a city, and enhance the quality of life” (Advisory Council on Culture and the Arts 1989, 2). Heritage and culture have been playing an increasingly important role in Singapore’s nation building.

Singapore’s independence in 1965 marked the beginning of a Singaporean nationalism and the evolution of a unique Singaporean identity. The first museum in Singapore, the Raffles Museum and Library established by the British in 1887, was renamed in 1960 as the National Museum and positioned to be a social history museum (Liu 1987). On 1 August 1993, arising from the recommendations of the Advisory Council on Culture and the Arts (ACCA), chaired by then second Deputy Prime Minister, Mr Ong Teng Cheong, the National Heritage Board (NHB) was established as a statutory board to oversee museum and heritage development in

Singapore as well as to serve as the custodian of Singapore’s heritage (National Heritage Board 2008, 5-6).

Under the NHB Act (Chapter 196A), NHB is empowered as the owner and custodian of the state heritage materials collections, collectively known as the “National Collection”, and “to collect, classify, preserve and display objects and records relevant to its functions”. These functions, as stated under the NHB Act, include the functions “to explore and present the heritage and nationhood of the people of Singapore in the context of their ancestral cultures, their links with South-East Asia, Asia and the world through the collection, preservation, interpretation and display of objects and records”, “to promote public awareness, appreciation and understanding of the arts, culture and heritage”, and “to record, preserve and disseminate the history of Singapore” (Attorney General’s Office, 2015).

The National Collection stands in excess of 220,000 artefacts/ artworks as at end 2015. A strong collection enables museums to build displays and exhibitions that educate, make

citizens proud of their heritage, and cultivate creativity. Museums without collections are merely exhibition halls. Collections are critical to the functioning of publicly-funded museums. The National Collection helps the museums serve the following non-exhaustive purposes:

*One: to provide public good.* Strong collections enable museums to build properly researched exhibitions that achieve the public goals of education as well as raise cultural appreciation and knowledge of national art development and ancestral heritage. The “one and only purpose of collections is the achievement of public good, now and in the future” (Anderson 2015, 15).

*Two: to tell the national story.* The National Collection enables the articulation of Singapore’s national story. It tells of Singapore’s history, shows its links with ancestral civilisations and the region, charts its journeys and documents its success. The National Collection gives tangible evidence of Singapore’s rich, multi-cultural heritage as a trading centre, and a creative hub.

*Three: to strengthen national identity.* The National Collection helps to build a national identity, which rests on the premise “to respect other races and religions, to care for others, and to understand the history and culture of Singapore” (Yong 2016). The National Collection is a key tool used to support the mission of NHB that our National Museums can draw upon to tell the Singapore story (National Heritage Board 2015, 13). This supports the need to deepen national identity in an increasingly volatile world by weaving “tighter relationships” amongst the communities so as to sustain “ethnic and religious harmony” (Sim 2016).

*Four: to create touch-points.* The National Collection helps to establish our national museums as key engagement touch-points for Singaporeans to strengthen their sense of belonging, rootedness and national identity. Works of art and artefacts can and do become

iconic images contributing to national pride and identity over time (Ashworth 1994). Consequently, the national museums’ collection mandate has enabled a process of search for worthy heritage materials for accessioning into the National Collection, thereby creating a sustainable pathway for Singapore’s heritage materials to be preserved and conserved.

The National Collection has been well-utilised to-date (National Heritage Board 2015, 14-27). The National Collection is not an end in itself. It is meant to serve larger purposes, including public education, inspiration and enjoyment.

### **Going Digital**

Beyond the physical display at our National Museums, Heritage Institutions, the National Gallery Singapore, the Singapore Art Museum and the Singapore Tyler Print Institute, which remains a relevant and critical aspect, digitising the collections and making them readily available for public consumption is an equally compelling and important aspect of deriving value from the National Collection. The impetus for digitisation appears to be relentless and multifarious:

*Recognise the reality of a changed world.* Going digital is inexorable: digital and social media are revolutionising the way people consume information and shaping lifestyles. The digital world is changing at a bewildering speed and its citizens are changing along with it. The proliferation of high-speed internet connections and mobile internet connectivity, as well as waves of new technologies and online services, has radically changed the web experiences for all in the past few years, particularly with the push for the concept of a semantic web, as coined by Berners-Lee, et al. (2001).

*Capitalise on the undeniable benefits.* The versatility of the social media has transformed once passive audiences into authors, editors, writers, columnists, photojournalists, and publishers. Smart and mobile hardware has heralded a new pattern of behaviour where people are constantly connected to the web wherever they are. These digital consumers expect websites and content to be interactive platforms. Digitising the National Collection and making it available through digital platforms will increase public understanding and enjoyment. It will make the National Collection more accessible (digitally) than ever before, thereby allowing the collections to be enjoyed more widely.

However, digitisation of the National Collection is a long and involved journey. The process required is multifaceted, the task elements involved are labour-intensive and time-consuming, and the new capabilities required have to be invested in and developed. More significantly, the retrospective digitisation of the sizable National Collection will be a major undertaking that requires a long time, much effort and lots of resources. Why then would one embark on the digitisation of the National Collection? Despite the impetus of a changed world and persuasive benefits in going digital, one must be clear as to how the heavy investment in digitisation is justified. The reasons for NHB in digitising the National Collection are to:

*Firstly, leverage digital technologies to harness the inherent value of the National Collection.* As part of a digitisation effort, high-resolution images will be made available instead of hardcopy photographs. These high fidelity images allow close-up study and appreciation. Many of the objects in the National Collection might not be exhibited for many reasons, for example, fragility, light-sensitivity, lack

of suitable exhibition theme at the moment, etc. With digitisation, these objects will be available to the public therefore realising the value of the collection – to be enjoyed.

*Secondly, reach out to wider and new audiences to achieve the educational and enjoyment purposes of the National Collection.* The wider and new audiences include local and overseas audiences. This increased reach is possible because digitisation allows the content to be available almost anytime and anywhere. Furthermore, digital experience complements and simulates the physical experience of a museum visit. This is because digitisation with proper cataloguing enables dynamic searches through non-linear associations to offer new and interactive digital experiences to users.

*Thirdly, derive higher productivity.* One productivity benefit of digitisation is that it creates the ability for more than one person to access the images and records from anywhere thereby removing bottlenecks of physical access. It allows collaboration and work to take place despite geographical distances. Asynchronous work processes could happen: in other words, members of a team need not be available at the same time to work on the same project. There is also easier and more effective retrievable experience through classification and indexing of the digital contents.

*Fourthly, allow better preservation of valuable collection information.* Even though the digital format will undergo technological upgrades and disruptions from innovations, the migration from one digital format to another is possible. Mass migration of digital formats is within reasonable means and relatively fast. As digital storage cost

has drastically decreased over the years, digitisation has become an attractive option. On the other hand, hardcopy records occupy huge storage spaces and require proper storage management to prevent pest and mould infestation. Furthermore, over time, the papers will structurally deteriorate as well as suffer foxing problems.

## Digitisation Journey

Digitisation of the National Collection is spearheaded by Heritage Conservation Centre (HCC), an institution of NHB. HCC formally embarked on efforts to digitise the National Collection in the early 2000s with the migration from analogue to digital photography and the recording of heritage objects in digital format with an accompanying dedicated digital depository. While there were various attempts at digitisation earlier, such as digital scanning of old photographs and slides, the watershed collections digitisation effort in HCC was the introduction of CUMULUS, a Digital Assets Management system, in 2002.

In 2005, the Museum Collections System (MCS), an NHB-wide collections information management system using customised commercial software – MuseumPlus, was introduced. This further contributed to NHB's efforts to digitise the National Collection. The MCS provided a means for NHB to create an online portal, the Singapore Collection Online (SGCOOL), to share the increasingly digitised records of the National Collection. The SGCOOL project in 2007 further enhanced NHB's digital offerings by incorporating label texts to each digital record. All these efforts have allowed NHB to enjoy greater work efficiency in the areas of collections management and exhibition planning, and more importantly, to increase public access to the National Collection through SGCOOL. The process efficiencies mentioned are widespread for collections management. One such benefit

is in stock-taking. For example, the annual six to eight-month long stock-take exercises would be near impossible without the MCS to generate the stocktake list. In terms of improvement to exhibition planning, for example, curators could do first-cut exhibition planning by viewing the photographs in the MCS as opposed to having to travel to the stores located about a half an hour's drive from the city to look at the objects.

The year 2013 marked an important milestone in NHB's digitisation journey when its Digital Engagement Framework was rolled out. The framework supports the vision of inculcating a cultured and gracious people, at home with Singapore's heritage, and proud of our Singaporean identity, by bringing the National Collection and our heritage resources to everyone, everywhere and everyday through the digital arena. Its overarching goal is in making Singapore heritage accessible, explorable and enjoyable through the digital means. It aims to facilitate public access and use of the National Collection and the NHB heritage resources for research, education and enjoyment. As part of this framework, NHB has embarked on an extensive ongoing exercise to digitise the heritage assets so that more of the content is made digitally accessible, and to create descriptive meta-data for the National Collection so as to enable greater and more sophisticated digital utilisation. This next phase of the digitisation exercise comprises three key components:

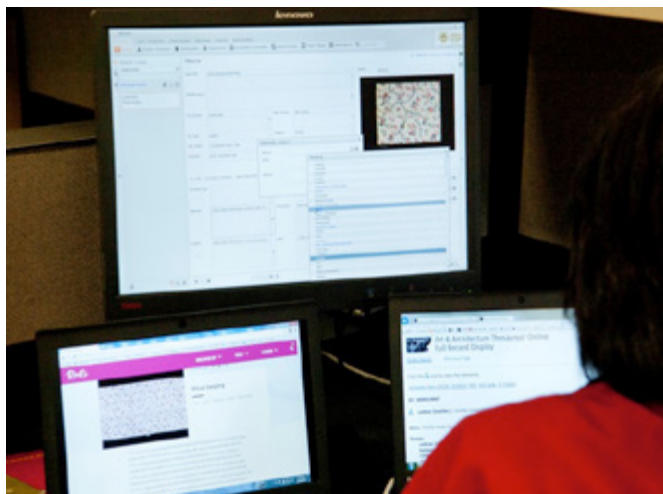
*One: enhancing digital photography capability.* This is to increase the image resolution of the visual images. Specifically, the small format photography capability has been upgraded from the maximum resolution of 12.1 effective megapixels to 36.3 effective megapixels. The enhancement involves evaluating the latest digital photography technology as well as the associate system upgrades required, and factoring in the resultant digital storage implications due to the larger file sizes.

*Two: developing new cataloguing capability.* This is for cataloguing and tagging individual records and resources with controlled vocabularies according to relevant taxonomies. Cataloguing is the structured process of organising information about cultural heritage materials, which involves metadata creation, subject description, taxonomical classification, and authoritative control of vocabularies for resource description and access.

Collection cataloguing principally involves: one, establishing a collections database structure or data schema that is compliant with international standards and references, for example, ICOM-CC's CIDOC Conceptual Reference Model (CRM), UK's SPECTRUM, Library of Congress Authorities (LCA), Getty's Art and Architecture Thesaurus (AAT) and Getty's Categories for the Description of Works of Art (CDWA), Codes for the Representation of Names of Languages – Part 3 (ISO 839-3)



Enhancing digital photography capability, 2016.  
Image courtesy of Heritage Conservation Centre.



Developing the new cataloguing capability, 2016.  
Image courtesy of Heritage Conservation Centre.

TYPE	NAME	ROLE
Metadata Schema/ Model (Data Structure Standards - Fields and Record Structure)	Getty's Categories of Description for Works of Art (CDWA)	Provides a framework/model/record structure with fields (elements) for describing our National Collection.
Metadata Value Standards (or Vocabulary Standards)	Getty's Art and Architecture Thesaurus (AAT)	Used as standard by NHB to assign controlled vocabularies for object type, subject terms, material, technique, events, etc.
	Library of Congress Name Authorities	Used as standards by NHB to assign controlled vocabularies for names of persons and place.
International Standards (For formats and classifications)	ISO 8601 ISO 639-3	Date format Language classification
Data Content Standards (Ontology model)	CIDOC Conceptual Reference Model	Provides definitions and a formal structure for describing the implicit and explicit concepts and relationships used in cultural heritage documentation.

**Table 1:** Description of Tools and References Used for Cataloguing

Strengthening of processes	<ul style="list-style-type: none"> <li>• Streamlined information capture during acquisition process</li> <li>• One system for acquisition-related information</li> <li>• Revamped conservation module to align conservation process across the sections incorporating exhibition and loan workflows to streamline processes throughout NHB</li> <li>• Capturing information generated for exhibition including general information and artefact write-ups</li> <li>• System reminders for submission of exhibition lists at different milestones</li> <li>• Track usage and location of loan items</li> <li>• Notifications can be set to remind users of loan expiry dates</li> </ul>
Discoverability	<ul style="list-style-type: none"> <li>• Key discovery fields such as artist, geographical association, etc., can now be controlled by a pre-defined list</li> <li>• Additional fields included</li> <li>• Cataloguing fields will be linked to established thesauri, both international and local               <ul style="list-style-type: none"> <li>- Getty Institute – Art and Architectural Thesaurus (AAT)</li> <li>- Library of Congress – Name Authority (LCNA)</li> <li>- National Library Board – Taxonomy and Thesaurus Editor (TTE)</li> </ul> </li> <li>• Ability to create NHB local terms to enhance discoverability by local users</li> </ul>
Accountability	<ul style="list-style-type: none"> <li>• Changes in all fields will be captured by audit logs</li> <li>• Ability to capture National Collection location information when it is not in HCC</li> <li>• Investigate changes made through audit module</li> </ul>
Value for money	<ul style="list-style-type: none"> <li>• Ability to exchange information in XML</li> </ul>

**Table 2.** Benefits from upgrading collection database software

and Data Elements and Interchange Formats (ISO 8601); and two, creating a management system to handle the workload of cataloguing new acquisitions and retrospective cataloguing of existing collections. See Table 1 for a description of these tools and references.

The major processes of cataloguing work are: descriptive cataloguing, subject cataloguing and metadata creation. Noticeably, metadata creation creates descriptive metadata that permits vast databases to be efficiently and effectively searched and queried. Metadata is structured information that describes, explains, locates, or otherwise makes it easier to retrieve, use, or manage an information resource; metadata is often called data about data (National Information Standards Organization 2014). These will drive us towards the vision of semantic web where web content will be guided by meaning, its semantics, and eventually be understandable by both humans and computers. The new metadata engenders many interesting and exciting digital offerings such as associative search, dynamic search and linked data.

*Three: upgrading the collections database software.* This is to upgrade the dated MCS from a client server-based software system, that is, the MuseumPlus, with linear search and basic web interfaces to a new web-based system which will have the ability to allow for smoother integration with other web applications and databases.

## Challenges

In most multi-year large-scale projects, inevitably, there are challenges – big and small – that have to be handled. The current project to digitise the National Collection is no exception. The key challenges are summarised in subsequent paragraphs.

### Scoping the project

Given the substantial size of the National Collection, the digitisation work scope is understandably huge. Recognising the constraints of limited time, finite resources and minimal acceptable professional standards to uphold for doing a good enough job, necessary trade-offs have to be made between the desire to work on the whole National Collection and the necessity of operating within realistic constraints. Taking into consideration that the initial stage of the project will include developing the digitisation capability, a reasonable target of 8,000 artefacts to be digitised over three Financial Years (FYs), from FY2014 to FY2016, was set.

### Balancing developmental work with operations

The digitisation project has to compete with other developmental projects and the heavy operational commitments for management's attention and staff's commitment. In this perennial situation of too-much-work-and-not-enough-people, it is vital to do deliberate fine balancing of prioritised workloads and taking strategic steps to improve the manpower constraint. Fine balancing requires all facts and relevant requirements to be considered, agreement on prioritisation to be reached and hard decisions to be made. Prioritisation to stay focused on what's important at each point in time is essential. Where required, timelines and schedules have to be relaxed to allow more time to work things through. This also requires an evolutionary approach that accepts incremental improvements to suit a changing resource situation and allows the desired path to be revealed. Such an approach implicitly recognises the importance of group dynamics and self-organisation for continual improvement. An organisational culture of trust has to exist to undergird this approach.



### Taking risks in pushing boundaries

Even with a vastly scaled down scope, digitisation of the National Collection is still a difficult multi-year project. Since this phase of digitalisation is to significantly improve our digital offering, new technologies are to be incorporated to stay abreast of users' expectations, and new values have to be created to enhance their experience. New knowledge in cataloguing for example has to be acquired, synthesised and applied. Sufficient lead time has to be catered in the project as there are unknowns in these capability development works. There is also strong need for progressive planning and calibration as the situation becomes clearer over time. Since the project has to be undertaken with the given headcounts, pushing the productivity boundary has to be done in order to squeeze out needed bandwidth to manage and implement this project. Clearly, there are many risks in undertaking new capability development and pushing for higher productivity. Staff involvement and commitment to the project objectives are therefore important.

### Handling discovered issues along the way

Given the inherent legacy issues of the National Collection, which was inherited from the British and accumulated over the years by different museums since independence, verifying old records and reconciling inevitable discrepancies are expected operational challenges of the project. Such issues surface throughout the project. Suitable and timely responses are required which in turn demand management attention and the allocation of limited HCC manpower to conduct investigation and implement approved corrections. Beyond operational issues, there are also other challenges like meeting the more stringent government internet security requirements, data exchange and interface issues between the RFID tagging software and the upgraded National Collection Database software, as well

as handling access requirements of corporatised entities, namely, the Singapore Art Museum and the National Gallery of Singapore, who need to use the National Collection. Some of these are tedious issues that require much clarification, discussion, and follow-up actions. Recognising such developmental requirements upfront is important as resources have to be factored, timelines need margins for buffer and expectations have to be managed.

### Opportunities

Despite the challenges, there are great opportunities that the National Collection digitisation project offers which makes the whole investment and enterprise worth-while.

#### Remaining relevant to a changed world

As the world has been changing at a fast pace, especially computing technologies that follow the accelerating pace of Moore's law, digitising the National Collection is therefore crucial as it gives NHB the wherewithal to engage an inexorably digitised society. This is necessary because it is the responsibility of an incumbent to ensure that National Collection remains relevant to a changed world. Digitisation of the National Collection effectively enriches our ability to transmit the messages about the history of Singapore, the story of our pluralistic culture, the narrative of our national identity and the extensive links and connections to the region and the world.

#### Making a difference to substantially enhance the digital assets

There is much that could be done to significantly improve our digital offerings; some are attractive, some are essential and some are pivotal. Deciding on what to prioritise and include is therefore important. It is sensible to focus attention in developing those essential and key enabling capabilities so that future

improvements could be leveraged upon. Acquiring the capability for capturing high-resolution digital images and upgrading the database depository platform to one that is based on web-based technology are essential. Developing the new capability of collection cataloguing is significant as it enables many digitally savvy functions to be performed. Collection cataloguing is an intensive activity that has to be performed upstream, that is, as part of the process of accessioning. Accessioning is the process of registering and bringing on board a new artefact into the National Collection. Hence, developing the collections cataloguing capability and commencing the process of cataloguing of the National Collection allow enhancement to our digital assets to be made available as soon as possible.

Harnessing greater value from the national collection

Digitisation opens up the incredible opportunity for the National Collection to be enjoyed by a larger audience. This includes reaching those who would not have visited the museum, thereby unleashing greater value from the National Collection. Going digital and reaching new audiences in the cyber space will create new functionalities through new platforms (such as “like” and “share” functions in social media) and likely give rise to the exciting possibility of generating new content. Already, the digitised contents of the National Collection are made available in the National Library Board’s OneSearch portal and the National Heritage Board’s Root.sg portal.

Learning opportunity

A lot of learning is required in the digitisation journey. The learning curve is steep and sufficient time has to be set aside for the organisation to become digital-aware and eventually digital-savvy. It is a gradual process for deep learning and cultural embedding and therefore has to start early. The individuals and the organisation have to learn and improve for the future; from learning more about heritage collection database design and operations (e.g., CIDOC CRM, CDWA, LCA, Getty’s AAT and CDWA) to 3D scanning – the next thing in image digitisation for HCC. There is much opportunity to be seized for being plugged into the new mode of information consumption and entertainment, such as augmented reality. We have to be on it and be ready.

**Conclusion**

Digitisation of the National Collection is about seizing opportunity, identifying the right technology, making the investment and giving time for the process to reach fruition. More importantly, the success factor for such a complex project is invariably about the people. Our people must own the vision and the goal. They have to be trained and enabled. An empowered approach requires more time and is slightly messier in implementation but the payoffs in terms of more effective responses by our people in the organisation are well worth the investment. NHB’s digitisation is ongoing. The effort shall multiply the value and enjoyment of the National Collection. Invariably, there are challenges along the way but the digitisation journey has offered valuable opportunities to all involved and opened up the digital frontier.

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