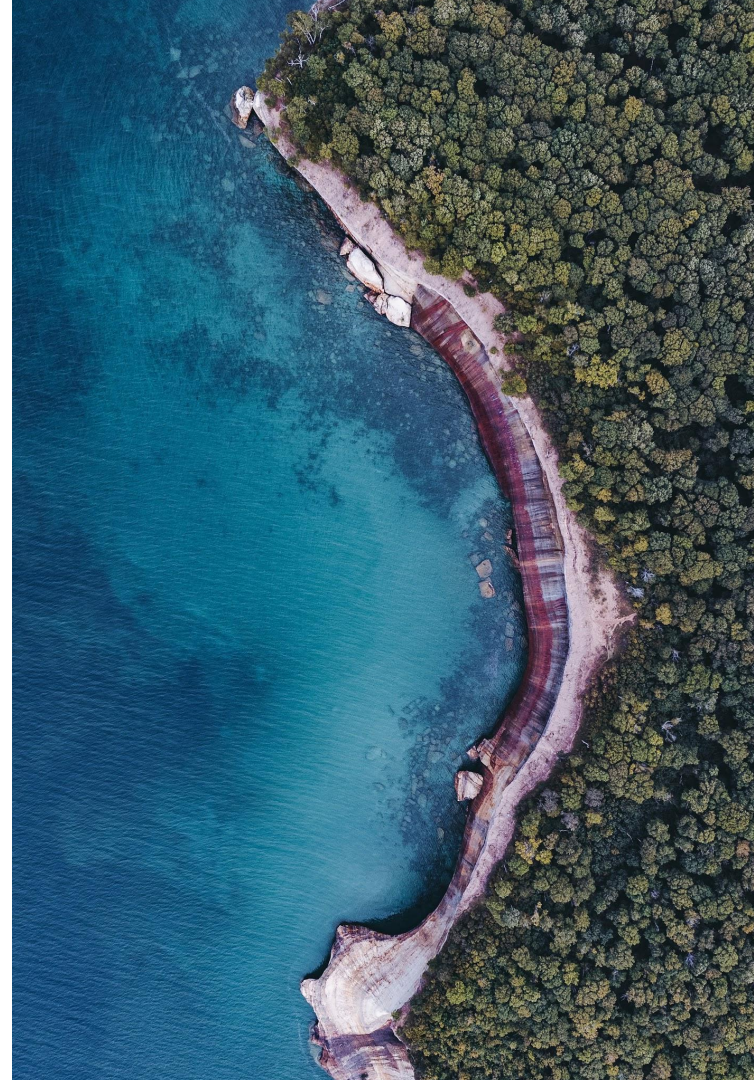# The World Museum

Case Study

The World Museum has approximately 25 million scientific specimens and cultural artefacts of significant importance from all around the world. The objects hold significant value to scientists and communities around the world. The museum is one of the oldest museums and continues to accept hundreds of thousands of donations every year, growing the museums collections significantly. To get the maximum value from the objects they must be digitised. Assume the museum has digitised a small part of their collection so far and has a database that stores basic specimen information and one image of the product. Having the entire museum collection digitised, including images and the creation of digital assets, would allow the museum to meet its strategic objectives, further scientific research, collaborate with other institutions, improve management of assets and digitally repatriate cultural objects to the community.

The museum has been on a journey to achieve this through different initiatives, and is now seeking to consolidate these efforts and accelerate the digitisation of all the collection objects. All specimens can be categorised in 8 categories listed below. Through the initial discovery period for the museum, 8 business requirements were identified to meet the museums goal of complete digitisation.
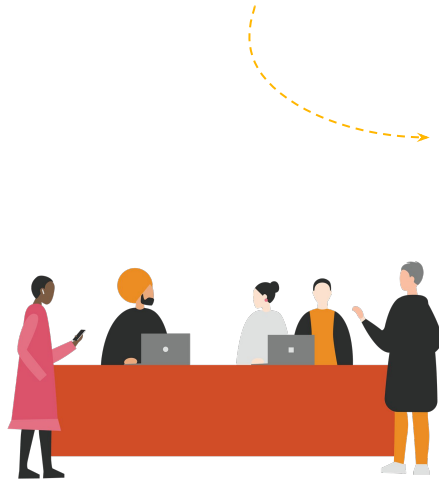
Object Categories:

Each object requires different handling, digitisation and data extraction requirements. A list of special considerations have been made to guide you but do not be limited to them entirely.
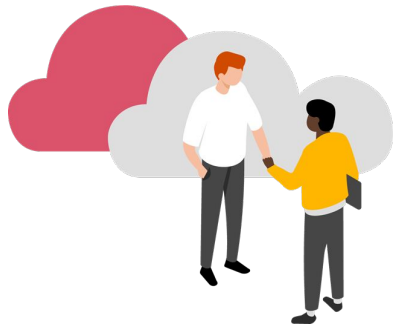
1. Pinned Objects
2. Small Dry Objects
3. Large/ Heavy Dry Objects
4. Liquid Preserved Objects
5. Frozen Tissue Samples
6. Paper Based Objects
7. Assemblages
8. Audio Visual Objects
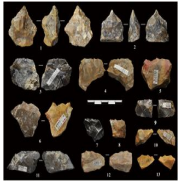
Business Requirements:

1. Populated Asset Register (Database)
2. Locations of all objects recorded and tracked digitally.
3. Standardised processes for asset and information management.
4. Imaging: The capture of images and selective high-quality images of objects across all collections.
5. Context: Enrichment of digital register with research, scientific data, cultural histories and advanced imagery to produce digital assets.
6. Conservation: Ensure safety, security and quality of objects.
7. Access: Digital repatriation and knowledge sharing with the broader community.
8. A performant, consistent technology for managing assets.

Objects	Description	Percentage (Size)	Collection Size
Pinned Objects	These are multiple similar objects that are pinned to a tray and stored together. Objects of the same species are usually pinned together. Multiple tags pinned to the objects, and each could provide different information about the object.	**20%**	**5,000,000**
Small Dry Objects	These are dry objects that do not require more than one person to move. Some objects have labels attached to them or to their storage containers. This category includes stone objects, ceramics, glass and other materials.	**30%**	**7,500,000**
Large/ Heavy Dry Objects	These are dry objects that require 2 people or more to move, and are predominantly in the cultural collection. Some objects may have labels attached to them.	**0.2%**	**50,000**
Liquid Preserved Objects	These objects are preserved in jars filled with formalin or ethanol for preservation, which requires special handling. Some objects may have labels placed inside the jar. A significant proportion of the museum's collection is stored this way	**40%**	**10,000,000**

Objects	Description	Percentage (Size)	Collection Size
Frozen Tissue Samples	These are tissue samples stored in ethanol at ultra low temperatures (-80 ℃) across 11 freezers.	**1.5%**	**375,000**
Paper Based Objects	This includes bound books, loose documents, journals, articles, newspaper segments and art. Most of these objects are in the Archives collection, however natural sciences and archaeology have a small proportion.	**2%**	**500,000**
Assemblages	A collection of objects that must be stored, moved or handled together to form an item. Predominantly in archaeology, an assemblage could include a large number of related objects.	**1%**	**250,000**
Audio Visual Objects	This includes photographs, negatives, glass plates and film rolls.	**5%**	**1,250,000**

Special Considerations

Pinned Objects:

The specimen sits on top of the labels and information is not readable without removing the item itself. Current process takes at least 30 minutes to arrange the items from a single container and is possible to perform only 2 per day due to the manual labour involved. Space and drawers/trays available to remove the objects and place them for further processing is limited.

Small Dry Objects:

High resolution 3D imaging of items is of interest across departments, to capture additional information.Information available on tags can be digital print or hand written text and is not consistent across images captured.

Large/ Heavy Dry Objects:

Limited space to capture high quality images. Artefacts will require multiple people to handle together and special equipment would be required for transportation or to stage for images. Some of the Museum's own equipment is considered part of the collection. This includes items such as microscopes, weighing machines, storage cabinets, desks, chairs and historic glassware. These objects are from a period of approximately 1800s-1900s and might require special handling.

Liquid Preserved Objects:

Specimens are stored in chemicals and trained staff are needed to handle safely with protective equipment. Liquids are sometimes required to be changed to better preserve specimens. Space used to extract specimens and collect information is limited. Some of the older chemicals used to preserve the specimens are toxic to humans and needs to be changes to safer chemicals. This process can take up to 3 days to completed for a batch of 15 glass bottles in one workstation.

Frozen Tissue Samples:

Specimens are stored under incredibly cold temperatures for conservation. Retrieving these specimens may require special handling as they are usually part of a larger organism. Small size of the individual items makes it difficult to capture information through photography.

Paper Based Objects:

Handwritten text is sometimes not readable. Some of the documents might be partially eroded due to preservation conditions. There are very few standard sizes or shapes as paper sizes and quality vary greatly. Much of the material to be digitised is correspondence sent to the museum, which comes in all sizes, often double-sided and usually handwritten.

Assemblages:

Details of individual items in the assembly are underneath the item or inscribed onto the item, difficult to read/interpret.

Audio/Visual objects:

Glass plates are VERY fragile and would need to be done on site to minimise handling and risk. Some prints and photographic albums are very old and in a fragile condition.

Response

Provide a response to the topics and propose an efficient solution to the museum's stakeholders. Which topic/s to address for which object/s, is completely up to your team. Propose a timeline of implementation for your solution. For example, you could choose to address topic 1 for pinned and small dry objects but not liquid preserved objects, or vice versa. Or you have a brilliant solution for topic 3 for all the objects. The response will ideally aim to meet the museum's own business requirements in order to appeal to stakeholders. The museum wants their collections to be completely digitised within a 5 year time frame. Multiple implementations of technology can be executed in your timeline consecutively, if you choose to address more than one topic or for more than one object. For example if you choose to address both topics 1 and 3. Topic 1 for only pinned and small dry objects, and topic 3 for all objects. You would need to show the timeline of implementation for both topics and their objects. You might choose to start the implementation of topic 3 first and after 2 years, you would implement topic 1 within the timeline. Win over the museum's stakeholders with your 'Road to Digitisation' timeline.

The benefits that come from digitisation is extraordinary. The museum could have the ability to host more exhibitions, allow scientists to identify species and make new discoveries from the specimens, connect communities to their artefacts, and all this could be done virtually while reaching more people than the museum could imagine. In an ideal world, communities, scientists, students and the general public would have access to the museums database to lookup, research and learn about all the 25 million objects the museum holds. This digitisation process is an opportunity for the museum to commercialise their objects without risking damaging billions of dollars worth of artefacts. Think of the future and the opportunities technology can hold for the museum. Don't limit yourself to what is achievable now but push yourself to show what could be achievable with technology.

Topics:

Topic 1. Vision capture techniques - video, photography, 3D imaging, etc - for information gathering.
Topic 2. AI/ML solutions for analysis of unstructured data e.g. text, images, video.
Topic 3. Sensor-based technologies for item location tracking and digital registry.
Topic 4. Automation opportunities for workflows and asset management systems.
Topic 5. Access to a scaled workforce for transcription and quality processes.
Topic 6. Your ideas on value creation through the digitisation process and final digital collection.

Challenges:

Quality

The proposed solutions should be future proof and robust to handle the complexity involved.

Time

Proposed solutions should seek to maximise information capture while objects are removed from storage, decreasing the handling time required.

Cost

Proposed solutions should seek to minimise cost wherever possible.

Special Considerations

Cultural Collections:

Ideally artefacts that come from indigenous communities should be able to be returned to those communities if they request it or made available to them through loans. Museum employees often go on trips to document about the artefacts from the original communities. Your technology solution should consider the information gathering process in these remote communities that often don't have phone signals or internet connections.

Environmental:

Consider your proposals environmental impact and aim to reduce the museums future carbon impact. The World Museum is already extremely cautious of their environment impact and stakeholders are worried complete digitisation of collections will only increase their carbon footprint. Your proposal should ease their worries and highlight how the museum could one day be carbon neutral/ negative.

Incorporate the museums environmental journey alongside the implementation roadmap. If the chosen technology uses a lot of energy consider how the museum could save that energy in other aspects of the business.

Tracking:

The museum has struggled managing and tracking their 25 million objects. Currently the museum has a barcoding system in place that has not been fully implemented. The barcoding implementation is aimed at setting the objects 'home' location and if moved, the barcode assigned to the object must be scanned and the new location scanned as well to let the system know what has been moved and to where.

This is aimed at mitigating theft attempts within the museum. The large number of employees and objects make it difficult to identify if objects are being stolen, misplaced or just never returned from loans. Ideally a tracking system should be able to identify the objects home (permanent) and current (temporary or out on loans) location, who moved it last and who has the right access to be able to move the object. Highly priced objects would only be handled by trained staff.

Thank you

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