



HONG KONG
maritime
museum
香港海事博物館

Hong Kong Historic Ship Evaluation

Interactive Qualifying Project Proposal

Submitted By:

Jessica Holmes
Codie Keene
Stephen Lee
Mitchel Wilkinson

Project Advisors:

Professor Robert Kinicki
Professor Zhikun Hou

Sponsoring Agency:

Honk Kong Maritime Museum

Date Submitted:

15 December, 2010

Table of Contents

Title Page.....	i
Table of Contents.....	ii
Table of Tables.....	iv
Table of Figures.....	v
Executive Summary.....	vi
1. Introduction.....	1
2. Background.....	3
2.1 History.....	3
2.1.1 History of Victoria Harbour.....	3
2.1.2 Harbour’s Impact on Daily Life in Hong Kong.....	5
2.1.3 Hong Kong Museums Today.....	7
2.1.4 Benefits of Central Pier 8.....	8
2.2 Technical Background.....	9
2.2.1 Harbour Overview.....	9
2.2.2 Tide and Current.....	10
2.2.3 Ship Berthing.....	12
2.2.4 Ship Mooring.....	14
2.2.5 Ship Maintenance and Repair.....	15
2.3 Safety and Legality.....	15
2.3.1 Regulations.....	16
2.3.2 Limiting Cases and Best Practices.....	17
2.4 Market Research.....	19
2.4.1 Museum Experience.....	19
2.4.2 Museum Setup.....	20
2.4.3 Museum Experience: China and Hong Kong versus the West.....	22
3. Methodology.....	25
3.1 Determining Qualities of Meaningful Museum Experience.....	25
3.1.1 Assessment of Market Conditions.....	26
3.1.2 Comparison to Similar Exhibitions.....	27
3.1.3 Discussion of Procedure in Developing an Operationally Viable Exhibit.....	27
3.2 Technical Considerations.....	28

3.2.1	Berthing.....	28
3.2.2	Mooring.....	29
3.2.3	Tides and Currents	29
3.2.4	Maintenance	29
3.3	Assessment of Museum Capacity	29
3.4	Legal and Regulatory Framework	31
3.4.1	Safety and Access.....	31
3.5	Summary	32
	Reference List.....	33
	Appendix A: Sponsor Description	37
	Appendix B: What is an IQP?	39
	Appendix C: Interview Transcripts	40
	Appendix D: Mayflower II Case Study.....	54
	Appendix E: Questionnaire	58

Table of Tables

Table	Page
Table 1: Comparison of Museum Visitation	22

Table of Figures

Figure	Page
Figure 1: Port of Singapore	11

Executive Summary

It is often said that those who ignore history are doomed to repeat it. Yet, despite this dire warning, a number of the museums who protect and preserve the world's shared cultural history find themselves struggling to stay afloat, victims of the age of instant information. In spite of the best efforts of the many dedicated professionals working in museums today, museum attendance around the world is falling at an alarming rate, with no signs of slowing. This stark reversal from previous eras has caused many to question the future of the museum as a cultural institution, with some viewing museums as little more than fading anachronisms in the fast-paced modern world. It is with this challenge to the collective livelihood of the museum in mind that the Hong Kong Maritime Museum has agreed to work with our IQP group in examining the feasibility of berthing a historic ship at their new location on Central Pier 8. In seeking to utilize this vessel as a floating exhibition, it is the hope of the HKMM that the public may better appreciate and experience the unique maritime culture of Hong Kong.

The nature of the museum experience varies widely by region and culture, reflecting largely unspoken attitudes about both the transfer of information and the connection between past, present and future. To achieve its purpose of transferring interesting and culturally relevant information to the public, a museum must first entice visitors and then sustain their attention through the course of presenting the material. To achieve both of these objectives, the unspoken attitudes held by the public regarding both museum content and presentation must be understood thoroughly, with this knowledge shaping the operation of the museum itself. In addition, museums must critically assess their own ability to develop and show an exhibition based on these attitudes.

In attempting to persuade the public to visit, several museums have developed or attempted to develop "signature" exhibits; in essence, exhibits that establish the museum as a part of the intellectual life of the city or region by drawing directly from the region's history with the chosen subject. However, if a signature exhibit is to succeed, the presentation media and chosen content must address both on

the museum's subject and attitudes held by the public regarding this history. Unfortunately, in the absence of costly and time consuming data gathering, extending well beyond the scope of the daily operations of a museum, information concerning these attitudes is simply unavailable to museum curators and staff. This deficiency can be detrimental to a museum which simply forges ahead in developing a signature exhibit without accurate information, ultimately losing both time and money on an exhibit the public does not accept.

The goal of our project is to determine the feasibility of the Hong Kong Maritime Museum (HKMM) acquiring a vessel to convert and operate as a "signature" museum exhibit, and to make recommendations based on our findings to the Director of the HKMM. To facilitate these recommendations, our group will create and complete a public survey regarding various vessel types and museum experiences, perform a cost-benefit analysis as well as standard engineering analyses of likely vessels, and undertake a broad literature review regarding Hong Kong maritime history. In completing this research, our group will be better able to evaluate a number of proposed exhibition types, reflecting the specific conditions present in Hong Kong and within the current operating capacity of the HKMM.

In closing, by completing this project, we will be able to remedy the information deficiency currently facing the staff of the HKMM, thereby allowing exhibition development to proceed, be postponed, or be canceled altogether. The ability to make this decision given pertinent data will in turn enable the Hong Kong Maritime Museum to utilize both their personnel and funds in an efficient way, thereby supporting the broader mission of the museum.

1. Introduction

Museums all over the world have the same fundamental goal: to educate people. In order for a museum to be successful in this endeavor, it must continually attract new visitors and motivate these visitors to return. In attempting this feat, there are a number of techniques to make a museum more visible and appealing to first time visitors, and an equal variety of tactics to encourage additional visits. One of the most common strategies is having a large, 'signature exhibit' that can serve as both a cultural and physical landmark for the museum. The Hong Kong Maritime Museum (HKMM) currently does not have an exhibit of this type.

The Harbourfront Commission, the governing branch for harbour planning, suggests that the "HKMM actively promote the berthing of 'historic ships' as a part of the future use of Pier 8" (Stephen Davies, personal communication, October 26, 2010). The Commission believes that a historic ship exhibits could be a very exciting experience for the HKMM, the Hong Kong public, and visitors to Hong Kong. However, the HKMM anticipates a significant number of problems with this idea. Most notably, due to the museum's private funding structure, the cost of implementing this plan is a significant challenge. "Museum ships are a trap for the unwary, often being a major millstone around a museum's neck and seldom a significant asset" (Stephen Davies, personal communication, November 9, 2010). Although Dr. Davies is skeptical about such an undertaking, the HKMM requires additional data concerning exhibition costs and profits before making an executive decision.

The HKMM is relocating to Central Pier 8 from its current location in Stanley in 2012, so as to expand its audience and facilities. By moving to a more visible and accessible location in comparison to Stanley, the HKMM could possibly "quadruple annual visitation and tap into new market segments" (Depot, Goldberg, Nadeau, and Rodriguez, 2010, p. xiv). This hypothesis, coupled with Central Harbourfront's conversion into a cultural and recreational center for the people of Hong Kong, has

resulted in the HKMM making maximum use of its new location a top priority. As a part of the Central Harbourfront's new, increased role in public life in Hong Kong, the proposed historic ship exhibit must both be cost-effective for the HKMM while simultaneously stimulating the public's interest.

There is previous research concerning the HKMM's move to Central Pier 8. In 2010, Depot et al. (2010) completed a marketing study for the HKMM involving its future relocation to Central Pier 8 and determined that a historic ship exhibit would improve the HKMM's overall visibility (pp. 125-127). Furthermore, other prominent people in Hong Kong also hold optimistic views concerning a historic ship exhibit. Professor Patrick Lau, Chairman of the Legislative Council's Panel on Development's Harbourfront Sub-committee, believes that "it will be most exciting if the Maritime Museum can bring in historic ships docked next to the Pier for visits by the HK public" (Stephen Davies, personal communication, October 26, 2010). However, the HKMM has several pressing concerns about the nature of the exhibit, and Dr. Stephen Davies in particular has made his reservations about the notion clear. The HKMM needs quantitative information regarding the exhibit's feasibility before making a decision. This represents the research gap our project team will address.

This project intends to compile and assess the pertinent data regarding the feasibility of berthing a historic ship at Central Pier 8 in Hong Kong, and to make informed recommendations to the Hong Kong Maritime Museum. To assess public demand for different types of historic vessels and visits to such vessels, our project team will survey passengers disembarking ferries at the Central Pier. We will also schedule interviews with HKMM staff to help assess the museum's capacity to handle such an exhibit. In addition to studying public demand, our team will investigate the proposed exhibit's related safety, technical, and cost issues. This approach will address the feasibility of berthing a historic ship at Central Pier 8. Overall, assessing the potential for a signature exhibit at the HKMM will enable museum staff to make a reasoned decision regarding the future of their institution while furthering its mission to preserve the maritime culture and history of Hong Kong.

2. Background

In approaching an inherently interdisciplinary problem like the feasibility of berthing a ship at Central Pier 8, a multitude of both technical and cultural considerations naturally arise. In the course of conducting preliminary background research, our team has identified and evaluated several factors which outline the unique history and challenges facing the HKMM, but more broadly, which describe the singular maritime culture of Hong Kong. While the material presented below represents a meager fraction of the whole of this continuing history, it is our intent that this material serve as a basis for further study.

2.1 History

In considering the possible addition of a new feature to the waterfront of Hong Kong, it is important to understand the historic and cultural background against which this feature would sit. Encompassing centuries of history and serving as a vital artery of trade for East Asia, the Hong Kong's Victoria Harbour is renowned both for its beauty and bustling activity. Its continued prominence in the daily life of the city serves to underscore its lasting importance and value in 21st Century Hong Kong.

2.1.1 History of Victoria Harbour

Hong Kong's Victoria Harbour has served as a central port for maritime exploration, trade, and naval operations and warfare (Davies, 2008). Hong Kong, which encompasses many islands in the South China Sea, as well as Kowloon peninsula and the New Territories, is blessed with natural sea access that greatly lends itself to maritime activity. The growth of shipping in Hong Kong has been shaped and influenced by politics and governmental change throughout its history. The early days of Hong Kong's shipping industry were characterized by the use of "junks" as the preferred means for transporting goods. These ships were relatively small, and their size limited growth in the shipping industry in Hong Kong, making the city merely a provincial player in maritime trade. However, the collapse of Guangzhou

as a rival port and ship maintenance center provided Hong Kong with the opportunity to rise to prominence. Thereafter, Hong Kong's small and very crude ship construction and docking facilities began a rapid development that, within a decade, had made Hong Kong the center for ship maintenance services for the entire South China Sea. The ability to construct and repair ships made Hong Kong's Harbour an essential port for the surrounding areas, with capabilities that no other port in the vicinity could offer.

The Yuan Dynasty was the first of the Chinese dynasties to have a large navy and treasure fleet (Lo, 1955), based in large measure on experience gained by prisoners of war who served the invading Mongols in building 45,000 ships. The Sung dynasty, which preceded the Yuan dynasty, did have a small naval fleet, but it was used almost entirely to defend the coasts, in particular the entrance to the Yangtze River and its ports. The Ming Dynasty, which followed the Yuan, marked a transition in Chinese maritime history, as a large treasure fleet commissioned by a native emperor was constructed for the first time.

Hong Kong was fortunate in that throughout its more recent history, the British government watched over the region to prevent invasion. Hong Kong avoided a wide variety of the threats of imperialist dismemberment from the Western powers that the rest of China was faced (Davies, 2008). The British Royal Navy's presence in Hong Kong's Harbour established the port as a naval base and provided the port with two distinct advantages. First, it helped in the suppression of piracy, which for centuries had caused mayhem and trade disruptions all over China's seas. Second, the Royal Navy's presence made it possible for the world's premier hydrographic surveyors to study China's coast and rivers. Surveying in the 1860's led to the creation of medium scale charts for Chinese waters that were of a quality and accuracy unknown at that time.

Hong Kong's entire shipping industry and marine activity during World War II flourished due to the high demand for resource and ammunition transportation. The harbour's importance in Southeast

Asia's transportation industry meant that nearly all of China's important goods came through Hong Kong Harbour. As Dr. Stephen Davies (2008) stated, "Effectively we can say that for Hong Kong – as for China in general – until the post Second World War period, coastal shipping was overwhelmingly the most important part not just of shipping, but of the entire transport system" (p. 6). In the post-war years, Hong Kong's shipping industry has continued to grow and expand. When Hong Kong was returned to China's rule in 1997, it was ranked as the world's eighth largest trading economy (Ember, 2001).

2.1.2 Harbour's Impact on Daily Life in Hong Kong

Victoria Harbour, one of the world's most beautiful natural harbours, was instrumental in Hong Kong's growth from a small fishing village to an international trading centre (Designing Victoria Harbour, 2010). Hong Kong is blessed with an expansive shoreline that lends itself well to a variety of maritime activities. For communities and areas near a body of water, the waterfront is often the unifying element that defines them and serves as the source of their beginnings, their heritage, and the reason for their existence (The Waterfront Centre, 2007, Home Page).

Victoria Harbour currently serves as a trade hub not only for China, but for Asia as a whole. The harbour serves as a major supporter of China's prosperous economy while retaining its abundance of beauty. Recently, however, the harbour has been suffering from overcrowding due to urban development. As expressed in a recent harbour evaluation, "The residents of Hong Kong identify with and feel closely related to Victoria Harbour, but extensive land reclamation and drastic transformations have deteriorated this feeling of belonging." (Rosendahl et al., 2010, p. 44). The harbour front is currently undergoing an extensive reconstruction project to restore its beauty and enhance its accessibility, with the intention of promoting the harbour as a worldwide tourist attraction. The renovated waterfront will be enjoyable, with open air promenade activities, shelters along the promenade, and a greener outlet for leisure. The result will be a *must-see* destination in terms of

restaurants, commercial shops, entertainment, and cultural activity, for both the residents of Hong Kong and tourists (Aedas Limited Planning Department, 2008, p.2).

Organizations throughout Hong Kong are working to make leisure and tourism the main focus of Victoria Harbour (Rosendahl et al., 2010). In contrast to other harbours throughout the world, Victoria Harbour has a lack of water based recreation facilities for public use, an aspect generally sought by locals and tourists alike. The extensive use of the waterfront for commercial uses has left little room for recreational facilities. The expansion of urban development has led to poor accessibility, lack of parking, and a poor land/water interface. There are very few boat launch ramps available for the general public, and almost no place for locals or visitors to dock a boat. These problems are only a few of the issues planners are currently facing in Hong Kong.

Marine users are often forgotten or neglected during project planning because of their decreased economic impact (Rosendahl et al., 2010). This oversight is due to the decline of industrial fishing in Hong Kong. Approximately 800 fishermen in Hong Kong are currently facing unemployment, and need to seek alternative livelihoods due to overfishing problems within local waters. This trend has led to a decrease in income level amongst fisherman, which only compounds the historic belief that the fishermen represent the lowest level of Chinese society. Hong Kong, as well as China, has a very hierarchical society consisting of distinct social and economic classes. The gap between rich and poor is extremely large. The only caste-like group is the portion of the population living on boats. This occupational group of fishermen was traditionally marginalized and ritually humiliated (Ember, 2001). Recently, the majority of these fishermen have moved onto land and integrated themselves with the rest of the population of Hong Kong. Although this is considered by many to be a positive trend, it is counter-intuitive for a society formed around maritime activity. Historically, many fishermen lived on their boats in the harbour and earned their living from the trade. The cultural history of China, however, does not value maritime history, making it uninteresting to the average person. One of the most

important values in Chinese society is family. Since a man must leave his family for days at a time when making a living from the sea, he cannot protect or be with his family, and therefore this behaviour is frowned upon by the rest of society. A problem exists in asserting that fishermen have played a vital role in the region's history and still serve a vital role in society today. The HKMM in particular is faced with the challenge of promoting maritime history. Although the fishing industry comprises a relatively small portion of Hong Kong's maritime history, as a result of the cultural stigma fishermen face, it is extremely difficult to attract museum visitors to see exhibits perceived as honoring this segment of the population. Addressing this issue is a very important part in preserving the cultural history that shaped the region.

2.1.3 Hong Kong Museums Today

Hong Kong, as a worldwide technological center and trade-based society, is a bustling city that embodies a fast paced style of living. This lifestyle is partly a result of the rise of technology, urban development, and public leisure activities. This movement has led to a decrease in museum visitation due to the lack of interest and public visibility of history, art, and culture. To alleviate this problem, museums must firmly grasp the characteristics of their target audience by tailoring exhibits to their visitors' interests. Currently, a worldwide effort is being placed on creating interactive exhibits that draw visitors into museums and encourage them to return. One method of retaining visitors that museums use is to frequently change exhibits such that visitors always expect to see something new and exciting.

The Hong Kong Maritime Museum (2010) is a privately funded educational institution that focuses on maritime history (Corporate). As a result of the HKMM's funding structure, it is extremely difficult for the museum to afford upgrades for their exhibits. Ultimately, a museum is a business, and its priority is to generate enough income to maintain itself and expand by drawing in as many visitors as

it possibly can. The HKMM expects to attract more visitors by moving the museum from Stanley, Hong Kong, to Central Pier No. 8. This location will provide a new and exciting atmosphere for museum visitors and maritime enthusiasts alike. Moreover, this new location will allow the HKMM to display a larger percentage of their exhibits due to an increase in available floor space. The HKMM is also considering the feasibility of increasing its visitor base by introducing an interactive exhibit in the form of a historic ship berthed alongside Central Pier 8. This would advance the museum's primary purpose in providing an enlightening and interactive experience that stimulates interest in the subject matter. This historic ship would be an elaborate exhibit that would appeal to many visitors and would serve as a reminder of Hong Kong's and China's rich maritime history.

2.1.4 Benefits of Central Pier 8

The previous research team from WPI investigated the benefits of the museum's future location at Central Pier No. 8 and determined the best approach to maximize the new location's potential (Depot, et al., 2010). Additionally, they analyzed the expected visitor base at the new location and found that it would be approximately 150% more than the current annual visitor base. Although this estimate carries considerable uncertainty, this project team collected hard data to support their conclusion. After collecting data by surveying travelers utilizing the Star Ferry Piers, the group offered a conservative estimate, a mid-range estimate, and an optimistic estimate of the number of people who intended to visit the HKMM at its new location. The mid-range estimate, determined to be the most likely number, was 135,000 people. Note, this estimate is based solely on the responses of travelers coming through the Star Ferry Piers, and does not consider the potential visitors coming from other modes of transportation. This ferry traffic is only approximately 10% of the annual ferry traffic through the area, and approximately 0.1% of the total public transportation in Hong Kong (Depot, et al., 2010).

The previous group made several recommendations for the museum including the need for a centerpiece exhibit outside the museum to catch people's attention and subsequently increase the likelihood that they would visit the museum. They proposed that this exhibit be a large anchor or a historic ship. The HKMM is currently planning to use a large anchor in front of Central Pier No. 8 in the center of a general park area to draw visitors to the museum. In addition, in response to these proposals, the HKMM has decided to evaluate the possibility of berthing a ship alongside Central Pier No. 8 to bring further attention to the museum. This ship would also serve as a potentially interactive exhibit to attract visitors that have never explored a ship.

2.2 Technical Background

In order to develop a museum exhibit that will be an asset to the Hong Kong harbour front, it is necessary to understand the conditions that any proposed vessel set in the harbour will face. Accordingly, a study of the natural phenomena affecting the harbour, as well as of the operations performed in moving and maintaining a vessel, will be discussed. A solid technical background will allow our group to provide relevant, quality information to the HKMM regarding the feasibility of the proposed historic ship exhibit.

2.2.1 Harbour Overview

A harbour is a location where ships and other watercraft can seek shelter from stormy weather, waves, and tides. The terrain of the surrounding landscape serves as protection for a natural harbour, while an artificial harbour requires man-made breakwaters, sea walls, or jetties for protection from inclement weather. Harbours and ports are easily confused; while a harbour refers to the actual location, a port refers to an artificial sea coast, a common sight in a harbour. Ports consist of piers, docks, machinery, and other structures that facilitate the loading or unloading of people and resources for all types of watercraft. Usually located in close proximity to ports, warehouses and ground

transportation systems promote the storage and distribution of various goods. With the extraordinary volume of goods being transported in today's world, ports have become bustling sites with dynamic atmospheres. Currently, the world's busiest port, in terms of total shipping tonnage, is the Port of Singapore (see Figure 1). "[Singapore] handled more than 25.8 million [containers] last year . . . the 2.4 million containers shipped that month are still below the port's monthly record of 2.7 million [containers]..." (Olsen, 2010, p. 2).



Figure 1. Port of Singapore. (Olsen, 2010, Port of Singapore).

2.2.2 Tide and Current

Like all ocean coastlines, harbours are continuously subjected to the changing tides. Cooley (2010) asserts that tides can be classified into four distinct stages. The transition from low to high tide is called the flood tide, while the transition from high to low is referred to as the ebb tide. Both transitional periods last for varying periods of time depending on features like coast orientation or water body dimensions. The final two stages include the high and low tides, the time when the water has

reached its highest and lowest points. Tides are either diurnal or semidiurnal; that is, there are either one or two high and low tides per day.

Tidal constituents include phenomena that influence tidal changes. Two occurrences, spring and neap tides, occur in roughly seven day intervals and serve to further characterize the four tidal stages. According to Cooley (2002), the spring tide refers to the period when the tide's range is at a maximum and occurs when the sun, moon, and Earth become aligned in a straight line (a syzygy). On the other hand, a neap tide describes the period when the tide's range is at a minimum, occurring when the Sun and Moon are at right angles from Earth. A secondary tidal constituent is the lunar altitude. The Proxigean Spring Tide, occurring every one and a half years, is an unusually large high tide that develops only when the Moon is in its New Moon phase at the point where its path brings it closest to Earth.

Tides are just one of many causes of ocean current throughout the world. Wind, temperature, waves, and water salinity are other factors that influence ocean currents. Chapman (2010) claims that the sun is largely responsible for the flow of ocean currents. When the atmosphere becomes heated, the wind that is created blows over the surface of the ocean and pulls on the water surface due to friction. Additionally, solar heat affects the density of the ocean water by changing its salinity. Cooler or saltier water is denser than warmer water, which results in current flow based on water density. The Earth's rotation also affects ocean currents through the process known as the Coriolis Effect. Simply put, the waters in the Northern Hemisphere tend to flow eastward, while Southern Hemisphere waters tend to flow westward due to the Earth's shape and rotation.

Chapman (2010) observed two distinct types of ocean current, namely, surface currents and deep currents. Surface currents are largely dictated by wind and the Coriolis Effect and can become very dynamic. For example, the East Australian Current flows at up to 6 miles per hour and the Agulhas Current off the eastern coast of Africa carries up to 80 Sverdrups of water. A Sverdrup (Sv) measures

total volume transport rate and is equivalent to one million cubic meters per second, or 264 million US gallons per second. Deep currents are primarily controlled by water density and salinity. There is no specified depth for a current to be considered a deep current, although anything beyond a mile below the ocean surface is generally factored into deep current analysis. Surface water that freezes in locations such as the Greenland and Labrador Seas becomes denser than the surrounding water. Consequently, the denser water will flow to a place of similar density. This continuous cycle of water movement leads to the formation of deep water currents.

2.2.3 Ship Berthing

Ship berthing refers to the process of securing a ship at a port. “The Art and Science of Ship Berthing” (2009) describes berthing as a very complex process, usually involving the participation of various specialized maritime engineers. Any ships trying to berth are commonly required by ports to have an expert pilot aboard, since ship staff may be unfamiliar with harbour navigation in that particular area. The pilot is required to maneuver the ship to its berth to help minimize the possibility of any type of accident. There is no right way to berth; the process can be safely and successfully completed using various techniques. “However, like a car driver, each pilot has his own method of berthing. And someone very truly said, ‘It is more of art than science’” (The Art & Science of Ship Berthing, 2009, p. 1).

“The Art & Science of Ship Berthing” (2009) identifies several significant factors to consider when berthing a ship. One of the more visible aspects is the size of the ship. Larger vessels generally have unresponsive handling and are not as agile as smaller watercraft. Large ships also require more time and distance to accelerate and decelerate and therefore must be delicately handled in confined areas like harbours.

The displacement and weight of the ship, usually measured in metric tons, is used to measure the mass of the ship when fully loaded. Vessel displacement “is the total volume occupied by underwater part of vessel multiplied by the density of water” (The Art & Science of Ship Berthing, 2009,

p. 1). Various measurements of displacements include full, standard, and light displacements, which are used in circumstances such as when a ship is completely full or empty. More force will be required to move a ship with a larger displacement.

Further, wind can have an adverse effect on ship berthing especially for large ships, since their surface areas will be larger. For instance, more force will be required to berth a ship if the wind is blowing out to sea (offshore wind). The additional force required may come from sources such as tugboats or ship thrusters. According to “The Art and Science of Ship Berthing” (2009), onshore wind is generally favorable for berthing conditions; however, too much onshore wind increases the risk of causing damage to the ship and port structures. With onshore wind it becomes considerably easier to mistakenly apply too much berthing force, which may result in the ship colliding with other port structures.

Sea current affects a ship’s overall ability to move and make directional changes and, like wind, can have an adverse effect on the amount of force required to berth a ship. “In tidal port with currents, berths are designed in such a way that current will be flowing at 15 to 30 degrees to the berth” (The Art and Science of Ship Berthing, 2009, p. 1). This characteristic limits the impact of sea current on a ship in berth. The speed at which vessels are berthed in normal conditions is usually 0.2 meters per second.

Depending on the size of the ship, tugboats may be necessary for berthing procedures. Tugboats, as their name implies, are extremely powerful vessels that can either push or pull ships to maneuver them into their berths. Horsepower output for tugboat engines vary widely, but most generate between 1200 to 3200 horsepower. “How Can a Tugboat Pull a Large Ship?” (2009) observed three different classes of tugboats. Seagoing tugs operate in the open ocean and are tasked with a wide variety of duties such as salvaging or towing disabled watercraft. These types of tugboats are generally not used as transportation services. Escort tugs are used to help large vessels navigate in confined areas and are reserved for situations where the ship in question is incapable of providing itself with adequate

maneuverability. Harbour tugs are used to assist all types of ships going in and out of ports and other inland waterways. They also serve port logistical purposes, providing aid in a wide variety of situations such as fire-fighting and ice breaking.

Fenders are used in ship berthing to avoid costly damage to either the ship or port structures. Their typical construction is a rubber or plastic structure containing air or foam and is designed to absorb the energy of berthing impacts. “Fenders are used to avoid damage and [are] designed to absorb the energy of the berthing impact at around 25% deflection” (The Art and Science of Ship Berthing, 2009, p. 1). The actual shape of fenders varies greatly depending on the type of vessel. Owners of smaller and recreational watercraft are usually able to choose from different kinds of fenders, while large, commercial vessels naturally have more stringent guidelines.

2.2.4 Ship Mooring

Once a ship is berthed, the next step in adequately securing the vessel is to moor it either to a port structure or by anchoring. Mooring to a port structure such as a pier requires tying mooring lines connecting strategic areas on a ship to a bollard, or vertical post, on a pier. Not surprisingly, mooring schematics vary widely for each type of vessel, but they should follow common sense rules, e.g., by definition, mooring lines should keep the vessel reasonably close to the port structure while restricting forward and backward movement.

Anchoring a ship requires knowledge of the characteristics of the seabed. Sorum (2007) reports that modern anchors can be classified into distinct designs depending on how the anchor sets on the bottom. Hook, Kedge, or Navy designs are used to deeply penetrate into a variety of problematic surfaces such as rocks, thick grass, and hard sand. Grapnel anchors are lighter versions of the hook designs and are used more commonly on small boats. Plough designs work well in surfaces ranging from soft mud to rocks and work by burying themselves deeper into the seabed as more force is applied to them, much like a farm plough. Lightweight or Danforth anchors, a specific type of plough design, are

best utilized in firm sand, gravel, or mud. Claw and Bruce anchors are essentially light plough designs that are purposely designed to reset, meaning these anchors will break off from the seabed and reset in a different position if sufficient force is applied. Sea anchors, instead of actually clinging onto the seabed, uses water itself as a weight by dragging large volumes of water along as a ship moves. Mushroom anchors usually serve as permanent mooring, as they typically weigh several thousand pounds and their shapes facilitate their settling firmly into soft ground.

2.2.5 Ship Maintenance and Repair

Ships and vessels that remain in the water full time require nearly constant maintenance. Although some maintenance and repair can be done while a ship is berthed and moored, most ships will require regular visits to a drydock. Putting a ship into drydock gives workers the ability to perform essential repairs that would have been impossible to perform otherwise. “These tasks could be from major overhauls such as changing the piston of the marine diesel engine of the main propulsion plant to moderate tasks like cleaning the centrifuges and purifiers or minor tasks such as cleaning a small filter of say the bilge pump” (What are the Different Types of Repairs Necessary for a Ship?, 2009, p. 1). Another example is the replacement of sacrificial anodes. These items are metallic anodes used to protect other metallic components from corrosion. These anodes help to preserve a ship’s hull and other submerged equipment when out in the water for long periods of time, and accordingly, require regular replacement, which can only be performed in drydock. In addition to completing maintenance and repair on existing watercraft, drydocks are used for the construction of new vessels.

2.3 Safety and Legality

In considering the intended purpose of a museum, namely the transfer of information to its guests, any institution developing a new exhibition must first concern itself with the safety of its visitors during the exhibition viewing. To this end, a thorough review of the legal framework in which the

museum operates, in combination with careful study and implementation of the best practices concerning exhibit design and operation are essential to the success or failure of an exhibition, and of the museum itself. This section provides a preliminary outline of this legal framework, discusses several practical safety considerations, and explores limiting cases affecting exhibition operation.

2.3.1 Regulations

In beginning a study of the legal framework under which an exhibition ship owned by the HKMM would operate, per the Hong Kong Maritime Law Association (HKMLA) (2008), all maritime ordinances are issued by the Hong Kong legislature. These ordinances are then enforced by the Hong Kong Marine Department, as overseen by the Hong Kong Dept. of Justice. Of the twenty-six ordinances listed by the HKMLA regarding harbour activity, the most directly applicable to the HKMM is the Ferry Services Ordinance (1997), which defines “ferry service” as “a service provided by means of vessel, other than exclusively powered by oars, for the conveyance by water of passengers, baggage, goods or vehicles, for a reward, between two or more points within Hong Kong waters, whether or not such points are varied in time, or whether or not service is operated to a fixed timetable” (p. 1). By this definition, even in the absence of conventional commercial cargo, any vessel operated by the HKMM which moves within the harbour would be considered a commercial vessel and is therefore subject to all Hong Kong Harbour regulations. A legal distinction may be made here for a vessel which is intended to be stationary, but as this is an exceptional case with regard to common harbour traffic, this is not directly addressed in the above ordinance. Regarding this distinction elsewhere in maritime law, in the United States, the designation of “substantially a land structure” as applied by the Coast Guard, may be used when the vessel is not intended to travel, but does have this capability, as in the case of the *Mayflower II* (Peter Aranstam, personal communication, December 3, 2010). To earn this designation, the emergency services network of any stationary vessel must be primarily land-based, and a means of communicating with this network while on board must be operational at all times. As an illustration of this rule, in the

event of a fire aboard the Mayflower II, the acting captain would contact the Plymouth Fire Department, not the Coast Guard or the Plymouth harbormaster (Peter Arenstam, personal communication, December 3, 2010).

Chief among the ordinances with which any moving HKMM vessel would need to comply is the Merchant and Shipping Safety Ordinance (1997), which lists requirements in areas including but not limited to passenger capacity, access to life-saving devices, fire-fighting devices, lighting, color and shape pertaining to visibility, navigational equipment, and communication/radio equipment. Given the historical absence of several of these technologies during the 18th, 19th and early 20th centuries, it is reasonable to presume that any genuine historic vessel acquired by the HKMM would require extensive retrofitting to be compliant with the modern regulations, with all costs of this retrofitting being borne by the HKMM. Though not explicitly discussed in either ordinance (perhaps understandably given the rarity of the case), the potential for the “grandfathering” of a historic vessel expressly based on its age, thereby exempting it from some or all of these regulations, may or may not exist. However, a final clause included in both ordinances grants authority to the Chief Executive of Hong Kong (the functional equivalent of a mayor or governor in the American government) to exempt any vessel from any portion of any maritime regulation.

2.3.2 Limiting Cases and Best Practices

In examining the feasibility of the HKMM operating a ship within Hong Kong Harbour, as with a number of complex engineering problems, it is necessary to consider the limiting cases which constrain the system. In this instance, a primary constraint is striking a balance between the museum’s desire to reach the largest possible audience and the logistics of accommodating those interested touring the vessel, but who may not be physically able. In examining the first-hand accounts of New York Times columnist Joyce Hor-Chung Lau (2007), it is noted that Hong Kong has a mixed reputation internationally with respect to accessibility. These mixed reviews stem in part from the difficulty of providing

accommodation up and down the steep hills prevalent in several parts of Hong Kong, but also arise from the absence of regulation enforcement with respect to commercial buildings. To combat this perception, the Hong Kong Tourism Board has established a website (Accessible Hong Kong) devoted specifically to promoting accessible accommodations and attractions, including the ability to create a travel itinerary which links to businesses and organizations that offer accommodating services.

With respect to maritime exhibitions, unfortunately the problem of wheelchair access remains largely unsolved, as neither the USS Constitution nor the Mayflower II provide wheelchair access to disabled patrons (The Travelling Wheelchair, 2010). This inaccessibility is based in part on the simple height of both ships, as well as the grade of ramp required even for able-bodied patrons to access the ship's main and half decks. Moreover, though use of both stationary and personal mobile hydraulic wheelchair lifts is quite common in the United States, this is not presently the case in Hong Kong. The problem of accessibility to historic maritime vessels is dependent on a number of environmental and regulatory factors, and will require additional study to understand.

In maintaining the safety of passengers while aboard any vessel operated by the HKMM, several additional procedural points merit consideration. First, concerning the number of persons aboard a ship at any given time, it is often preferable to limit the number of patrons to a figure below the maximum legal occupancy, so as to allow the operating staff to more closely monitor a given group, as well as to limit the number of cases where disoriented or inattentive passengers may bump into fellow passengers or staff (Peter Arenstam, personal communication, December 3, 2010). Though always filling to the maximum occupancy increases museum revenue for a given unit of time, the ability of a given passenger to explore the vessel unhindered, or to ask questions of the available staff is diminished when dealing with larger crowds, thereby hurting the overall exhibition experience, and decreasing the likelihood of a repeat visit.

Secondly, when performing vessel maintenance during visitor hours, as is often required, special care must be taken to assure passenger safety when staff are working above the average passenger height, or when working with materials including but not limited to paint, tar, and linseed oil. To inform the passengers of increased dangers in the area, it is advisable to have maintenance staff inform either the tour guides or members of the museum staff who interface directly with guests, who may, in turn, inform guests prior to boarding the ship (Peter Arenstam, personal communication, December 3, 2010). Additionally, the use of signage or the physical cordoning off of certain areas, while not ideal, may be employed to ensure visitor safety. Finally, to ensure the safe and efficient embarking and disembarking of passengers, it is highly recommended to have a staff member monitoring the ship's gangway ramps during visitor hours (Peter Arenstam, personal communication, December 3, 2010). In addition to offering assistance to anyone having difficulty embarking, this staff member may also serve as a ship's "gatekeeper", monitoring both occupancy and passenger behavior, as well as alerting the appropriate ship or museum staff in the case of any incident without distracting from an on-going passenger tour.

2.4 Market Research

For a museum exhibit to achieve widespread acceptance, care must be taken to understand and acknowledge the cultural mores and sensitivities of the intended audience. To achieve this understanding, the museum must complete a systematic study of museum culture (or lack thereof) of the proposed exhibition site, with particular attention paid to the development and presentation of content in accordance with local custom and preference.

2.4.1 Museum Experience

People around the world have a variety of expectations for a museum, entrenched in cultural attitudes, concerning both a museum's specialty and preferred presentation style. Furthermore, groups will differ in their decision to visit a particular museum based on the same marketing pitch, as museum

visits are considered a leisure activity, and are therefore subject to differences in taste. Falk and Dierking (2000) said that one of the main results of a visit to a museum is gaining new knowledge. More importantly, when a group of people visit a museum, visitors often learn for the sake of learning and not out of obligation. This means that a person may in fact learn about a topic at a museum but not realize they have learned it until that knowledge is used. Also significantly, this phenomenon means that people who do not enjoy education in a more rigid school setting may learn better at a museum and will therefore enjoy the visit.

2.4.2 Museum Setup

Falk and Dierking (2002) explained that in order for the visitors to have the best possible experience, the museum must be organized so as to interest visitors of all learning styles and levels of background knowledge. Since there are different learning styles a museum should gear its exhibits to as many styles as is possible. The three main types of learners are visual, audio, and tactile. Visual learners learn best by seeing things, so a video or staged display of artifacts would be the most helpful for them. An auditory learner is best helped by hearing an explanation meaning an audio or guided tour would be the most effective presentation for them. Tactile learners are best served by direct interaction with objects, strongly suggesting that interactive exhibits would be best for them. Since no one learning style can encompass the entirety of a museum's visitor base, it is important that a museum has a mix of all these exhibit styles.

Falk and Dierking (2002) claimed that not only do museums need to consider the style of their exhibits, but must also consider the sorts of tours visitors will take. There are three primary styles of tours, namely solo tours, group tours, and audio tours. In a solo tour, the guest explores the museum at his/her own pace and an order that suits the individual. This allows visitors to spend the most time at exhibits that particularly interest them, while spending less time at exhibits they find less interesting. A group tour is when a staff member brings groups of visitors around the museum. The advantage of this

style of tour is the staff member explains the exhibits and answers questions; however, this prevents the visitors from spending extra time at exhibits that particularly interest them. The audio tour is a combination of the two previous tour styles. For an audio tour, a tour guide records their description of the different exhibits for visitors to listen to as they view the exhibition. This tour style combines the ability of visitors to move at their own pace while still allowing an expert to explain the exhibits.

Falk and Dierking (2002) stated that for most museum visitors, going to a museum is an activity done for fun in their free time. In fact, people who spend their leisure time engaging in intellectual activities like reading are more likely to go to museums than people who tend to spend their leisure time participating in group activities. Falk and Dierking suggest that this is due to the challenge of having a large group of people to go to a museum together and having all the members enjoy the time without the group splitting up. Intellectual pursuits are often followed in smaller groups or alone, making it easy for these people to enjoy themselves without the group having to split up.

Falk and Dierking (2002) wrote that many of the groups that go to visit a museum are family groups. Quite naturally, both children and parents must both be able to enjoy the museum for a shared trip to be a success. Often a child will go into a museum setting with little or no knowledge of the subject, while a parent may have a particular interest in the subject. This disparity in knowledge often adversely affects the child's museum going experience. Children also have shorter attention spans, meaning steps must be taken to ensure they do not become bored. Children typically enjoy interactive exhibits, although there is a potential danger in the child using the materials in ways not intended by the museum staff. Adults often want to see more complex exhibits and are not necessarily as interested in the interactive elements of the exhibits. To reiterate, it is essential to arrange a museum such that all members of the party will enjoy the visit, even when there are differences in perspective.

2.4.3 Museum Experience: China and Hong Kong versus the West

Museum experiences are different in China than in the West. First, on the whole, there are more museums in the West (Stephen Davies, personal communication, November 9, 2010). The number of museums in China has increased recently, but given the large population of China, the number of museums is not comparable to the number of museums in the West.

Museums are much more popular in the West than in China. This is illustrated in Table 1, which compares the attendance at different maritime museums around the world. One of the reasons for this may be the relative rarity of maritime museums in China. According to the Hong Kong Maritime Museum in a document submitted to the Hong Kong legislature (2008), "Maritime museums are a new departure in mainland port cities in China" (p. 25).

An additional dissimilarity between the compared museums is that the less popular museums have admission fees. Falk and Dierking (1992) stated that although admission fees do not make a museum less popular per se, they may prevent people with lower incomes from visiting. This can most clearly be seen in the comparison between the Mayflower II and Plymouth Rock. Although the two museums are in close geographic proximity to one another, Plymouth Rock garners five times as many visitors per year.

Table 1: Comparison of Museum Visitation (Sources listed)

Museum	Visitors per year	Admission price	Source
National Maritime Museum, London	2,367,904	Free	ALVA, 2009
Mayflower II, Plymouth, MA, USA	200,000	\$10 USD	Arenstam, P. Personal Communication, December 3,2010
Plymouth Rock, USA	1,000,000	Free	America's Best History , 2009
Hong Kong Maritime Museum, Hong Kong	130,000	\$10 HK (\$1.29 USD)	Depot et al, 2010, p. XV; Hong Kong Maritime Museum, Location
Hong Kong Museum of History, Hong Kong	688,743	\$10 HK (\$1.29 USD)	Depot et al, 2010, p. 20; Hong Kong Museum of History, Admissions

The more likely cause for the disparity in popularity between museums in Hong Kong and elsewhere is “an as yet largely 'non-museum' culture” (Stephen Davies, personal communication, November 9, 2010). In a ‘museum culture’, families and other social groups will visit museums multiple times over the course of a year. Falk and Dierking (2002) stated that visitors often come from the more highly educated, more affluent part of society. In contrast, Hong Kong residents are not very affluent, with the average visitor to the Hong Kong Maritime Museum currently earning less than \$20,000 Hong Kong (\$2,580 US) a month (Stephen Davies, personal communication, November 9, 2010). This is the

standard income for a middle class Hong Kong resident, but it is much lower than monthly income of a middle class American.

3. Methodology

The goal of this project is to determine and make recommendations as to the feasibility of berthing a historic ship at Central Pier 8 in support of the pending relocation of the HKMM. Several factors need to be thoroughly examined in order to make these recommendations. First, a public survey comparing possible museum exhibitions will help in determining the condition of the market. Second, our team will determine and analyze the technical aspects of berthing the ship to ensure the integrity of the exhibit. Third, it is necessary to study the organization and personnel changes needed within the HKMM to accommodate the operation of a vessel by the museum staff. Finally, the safety of the visitors must be ensured, as well as the compliance of the vessel with all relevant maritime regulations.

Each of these areas will be addressed by employing the methods described in the following sections. The primary methods used will be a public survey, a compilation of currently available technical data supplemented by team observations, and interviews with local experts.

3.1 Determining Qualities of Meaningful Museum Experience

Several qualities of a museum have the potential to increase the value of the museum-going experience. We need to determine the most important of these qualities according not only to the people of Hong Kong, but also visitors from around the world. We plan to determine these qualities through both a public survey and qualitative comparisons to other museums we have learned about and visited. Chief among the museums we will use to benchmark the HKMM is the Mayflower II located at the Plimoth Plantation in Massachusetts. This benchmark was selected as the HKMM shares a common subject and exhibition style with the Plantation.

3.1.1 Assessment of Market Conditions

As with any new business venture, a thorough market analysis must take place to determine the demand for what is being offered. In this case, a historic ship is being proposed as a new exhibit at the HKMM alongside the museum's new location at Central Pier 8. Public acceptance of and strong interest in this proposed historic vessel is necessary if the HKMM wants to increase visitation and have this new exhibit be a success.

In order to better understand the museum culture in Hong Kong, the preferred media, content, and admission price will all be analyzed. To help us determine public opinion, our team will survey visitors to the Central Pier District disembarking/embarking to the piers' ferries. This survey will use a written, multiple-choice questionnaire, as well as some yes/no questions, and will be offered in both English and Chinese. The implementation plan includes administering the survey in pairs at the pier complex during times of heavy commuter traffic in both the morning and afternoon. Although commuters will be in a rush during these times, they will be waiting in lines for the ferry and may have the time to answer a brief questionnaire. Our team is also considering conducting this survey during off-peak hours when commuters are not in such a rush. These off-peak hours are also apt to contain a larger percentage of tourists, representing a large portion of the museum's anticipated visitor base at Central Pier 8. Our team has chosen to focus on commuters as the sample population so as to draw comparisons with the work of previous IQP groups working at the HKMM. Moreover, given the broad cross section of the Hong Kong and tourist demography the ferries carry on a daily basis, this research assumes this population will reflect the views of Hong Kong residents and tourists as a whole.

The target sample size is 400 persons over the course of approximately ten working days. This enables our team to consider a variety of opinions, while assuming a limited response rate, particularly noting the cultural aversion in Hong Kong to answering survey questions. Note that the responses generated by this survey may only be considered descriptive, and may not be used as part of a more

rigorous statistical analysis. The questions themselves focus primarily on preferred exhibition content (e.g. types of ships) but will also explore visitor demographics and acceptable admission costs. For a draft questionnaire, please see Appendix E.

3.1.2 Comparison to Similar Exhibitions

Visitor and demographic data collected in Hong Kong will be compared to that of similar museums in the United States. The primary museum chosen for this comparison is the Mayflower II, docked in Plymouth, MA, supplemented by the Gloucester Maritime Heritage Museum. Our team had the opportunity to interview Mr. Peter Arenstam of the Plimoth Plantation, who is the Director of Artisans of the Mayflower II (Please see Appendix C for an abridged transcript of this interview). We have also visited the Gloucester Maritime Heritage Museum, which does not have a floating exhibition but who shares in the study of maritime history. The intent is to leverage these on-site experiences and apply the knowledge gained to the exhibit being considered by the HKMM.

The survey will determine the preferred media and content; however, the issue of pricing will be further researched by comparative analysis. Our team will identify and compare the pricing preferred by the public to that of similar exhibits both in Hong Kong and around the world. A larger cost benefit analysis, describing the overall exhibition feasibility, will be completed in conjunction with a study of the costs of maintaining and staffing any proposed vessel. The constraining factor of this analysis is that the HKMM must recoup its development and maintenance costs in order for the exhibition to be feasible.

3.1.3 Discussion of Procedure in Developing an Operationally Viable Exhibit

In order to develop a financially prosperous and operationally sustainable exhibit, the HKMM's budget and staffing capacities must be balanced with its desire to expand. In hopes of understanding how another privately funded museum strikes this precarious balance so as to develop a museum operations model, we interviewed the curator of the Higgins Armory, Dr. Jeffrey Forgeng, and a

Professor of History at WPI. A transcript of this interview may be found in Appendix C. This information will be relayed and discussed with the staff of the HKMM to better prepare them for the potential difficulties they may face in establishing this new exhibit.

3.2 Technical Considerations

This section describes the proposed strategy to handle technical considerations of our project, such as the berthing and mooring of a historic vessel. These methods will focus on making the transportation, docking, and future repairs of the historic vessel as efficient as possible. In the absence of a sound technical foundation and a vessel that can be maintained, the exhibit will not succeed.

3.2.1 Berthing

As previously stated, several factors must be considered regarding the berthing of a ship. Ship characteristics such as size and displacement are easily attainable and thus, no additional work will be required here other than ascertaining these figures. Wind speed and direction can be measured by an anemometer, which can be placed in any open area unobstructed by objects such as trees or buildings. Buoys can also measure wind speed and direction, as well as record information on ocean current speed and direction and wave height, among other statistics. These data should be available from authorities in Hong Kong, namely the Hong Kong Observatory and Hong Kong Marine Division.

The use of tugboats depends altogether on the historic ship being berthed, although some form of special transportation may have to be arranged due to the vessel's historic nature. The use and type of fenders will also largely depend on the exact ship being berthed. Once the ship's exact size and shape is clear, fenders can be selected that fit the criteria of that particular vessel.

3.2.2 Mooring

The mooring of a ship can be done either by anchoring to the seabed or by tying it to a port structure. All ferries at the Central Pier are tied to port structures, rather than anchored; therefore it is assumed that this is the optimal solution for the HKMM's potential vessel. Not much can be done concerning mooring structure until an actual ship is chosen for the exhibit, although this project should determine the pier's condition to handle ship mooring by inspecting specific areas such as the bollards.

3.2.3 Tides and Currents

As previously stated, tides, waves, and currents can be easily measured and recorded by buoys. The Hong Kong Observatory also contains a wealth of information on predicted tides in Hong Kong Harbour. This information, as well as a multitude of other tidal and current related statistics, is all available on their website. In addition, our team may call upon the expertise of local authorities including ship captains, tour vessel operators, and local fishermen.

3.2.4 Maintenance

A ship maintenance plan must be determined and finalized after identifying a historic vessel. This will be accomplished by inquiring within the HKMM as well as local ship repair businesses. The location of a drydock with suitable equipment may then be found in Hong Kong Harbour.

3.3 Assessment of Museum Capacity

The next step toward developing a set of recommendations as to the feasibility of berthing a ship to be operated by the HKMM is to analyze and informally audit the HKMM itself. At an organizational level, it is critical to identify the resources, if any, the HKMM can bring to bear in rehabilitating, retrofitting, storing, piloting, and maintaining a vessel of any size to be used as an exhibit. By Dr. Davies' own admission, an exhibit of this magnitude and of this type (e.g. outdoors, and

potentially leaving the grounds of the HKMM and entering waters regulated by the city of Hong Kong as a part of the experience) is unprecedented in the history of the HKMM. This certainly poses a formidable challenge when one considers the requisite skill sets to maintain a vessel's seaworthiness, or actually piloting a ship in one of the busiest harbours on the planet while simultaneously supervising a group of tourists. If one assumes that the current staffing and budgeting of the HKMM does not fully account for or otherwise encompass this broad range of knowledge and talents, estimates of the costs of remedying these deficiencies, whether through the addition of facilities or the hiring of staff, must be made. These costs will in turn be added to an overall cost-benefit analysis, wherein the costs of establishing and operating the exhibit are measured against the projected revenue from additional museum visitors seeing the exhibit, as estimated by our team's public survey. An alternative to this approach is to identify possible subcontractors or outside agencies able to provide maintenance or other services and to add this cost to the overall analysis. Once the overall cost-benefit balance has been calculated, our team will be in a far stronger position with regard to making recommendations as to feasibility.

To make this assessment, our team plans to conduct a series of in-depth interviews with key personnel of the HKMM, beginning with the director, continuing through to the museum curators, and concluding with any staff having prior academic or professional background in maritime engineering, as well as in exhibit development. This approach will enable our team to learn pertinent facts concerning the museum, including an overall operating budget and number of personnel, but will also provide a picture of the day to day operations of the museum, and the effect the addition of a new public exhibit might have. Additionally, given our interviews with and knowledge of other organizations with similar exhibits, our team will be in a position to gauge whether significant structural or organizational changes would need to be made within the HKMM to accommodate a floating exhibit. The research methodology also includes an interview with a member of the Star Ferry staff to gain insight on the costs of operating a ferry to serve as a comparison to the potential costs of operating a vessel at the HKMM.

3.4 Legal and Regulatory Framework

With respect to the legal and regulatory framework of any potential HKMM exhibit, our team plans to familiarize itself with all pertinent regulations through a combination of independent study prior to arriving in Hong Kong, and by consulting with any Hong Kong legal professionals or civic leaders available for personal interviews or correspondence. As noted by Dr. Davies, with regard to the transport of goods, including the taking on-board of paying passengers, the Hong Kong harbour front is tightly regulated, with stiff financial and civic penalties for those found to be in breach. While our team certainly has the ability to examine legal documents passed by the Hong Kong legislature pertaining directly to the harbour, seeking the counsel of a legal professional, better qualified to interpret and clarify issues of museum liability, definitions of commerce, or other regulatory vagaries, is the only responsible course as de facto representatives of the HKMM. Moreover, engagement with the legal and regulatory framework of the harbor seems a natural first step if the HKMM would hope to pursue exemptions from any named regulations, in the name of cultural preservation and education.

3.4.1 Safety and Access

Finally, concerning issues of safety and accessibility, our team plans to combine independent research completed prior to our arrival in Hong Kong with any team or museum staff observations as to daily operations within the harbor. These observations include but are not limited to noting standard embarking and disembarking techniques from a ship in the harbour, and how local businesses address the issue of serving disabled patrons. These questions may also be addressed through discussions with other vessel operators in the harbour, including tour guides and ship captains. There may be a language barrier in speaking with other harbour users; however, it is likely that several operators/captains speak English, and translation services are also available through the HKMM. This research and observation will also extend to the treatment and customs regarding the accompaniment of minors, as an issue of

both safety and legal liability. This will include a review of existing museum safety policies, and group brainstorming in establishing any additional policies.

3.5 Summary

In summation, this project intends to complete a multi-step investigation of the feasibility of the HKMM berthing an exhibition ship at Central Pier No. 8, drawing techniques and information from a survey, personal interviews, consultation with experts, and additional independent research and observations. Using data collected in a number of areas, our team hopes to prepare a series of concrete recommendations for the HKMM regarding the feasibility of the proposed exhibition.

Reference List

- Aedas Limited Planning Department. (2008, January 31). Urban Design Study for the New Central Harbourfront. *Design Responses to Public Views on the New Central Harbourfront*. Unpublished study conducted for Harbour-front Enhancement Committee Task Group, Hong Kong.
- ALVA. (2009). *Visits made in 2009 to visitor attractions in membership with ALVA*. Retrieved November 21, 2010, from http://www.alva.org.uk/visitor_statistics/
- America's Best History. (2009). *Plymouth rock*. Retrieved November 21, 2010, from <http://americasbesthistory.com/abh-plymouthrock.html>
- Berard, B. Scotta, L. Fallon, J. Rosendahl, E. Lora, S. Wong, A.,...Yang, B. (2010). *Designing Victoria Harbour - integrating, improving, and facilitating marine activities*. Unpublished IQP Report. Worcester: WPI.
- Biemer, P.P., Lyberg, L., & Wiley, J. (2003). *Introduction to survey quality*. Hoboken: Wiley Online Library.
- Carroll, J. M. (2007). *A Concise History of Hong Kong*. Lanham, Maryland: Rowman & Littlefield Publishers.
- Chapman, P. (2010). *Ocean currents*. Retrieved November 19, 2010, from <http://www.waterencyclopedia.com/Mi-Oc/Ocean-Currents.html>
- Cieplik, K. (2009, July 12). The traveling wheelchair: USS constitution. Retrieved November 27, 2010 from <http://thetravelingwheelchair.com/uss-constitution/>
- Cooley, K. (2002). *Moon tides*. Retrieved November 19, 2010, from <http://home.hiwaay.net/~krcool/Astro/moon/moontides/>

- Deng, G. (1997). *Chinese maritime activities and socioeconomic development, c. 2100 BC-1900 AD*. Westport: Greenwood Press.
- Depot, J., Goldberg B., Nadeau E., & Rodriguez B. (2010). *Hong Kong Maritime Museum Relocation Project*. Unpublished IQP Report. Worcester: WPI.
- Davies, Stephen, Dr. (2008). *A short History of Shipping in Hong Kong*. Unpublished manuscript.
- Ember, M., & Ember, C. R. (2001). *Countries and their cultures*. New York: Macmillan Reference.
- Falk, J. H., & Dierking, L. D. (2000). *Learning from museums: Visitor experiences and the making of meaning*. Walnut Creek: AltaMira Press.
- Falk, J.H. & Dierking, L.D. (2002). *The museum experience*. Washington DC: Left Coast Press.
- Hong Kong Legislative Council. (1997) Ferry Services Ordinance 104, Maritime Ordinance. DOI: June 30, 1997
- Hong Kong Legislative Council. (1997) Merchant Shipping Safety Ordinance 369. DOI: June 30, 1997
- Hong Kong Maritime Museum. (2008). *Submission by the Hong Kong Maritime Museum to The Home Affairs Panel of The Legislative Council of The HKSAR No. CB(2)737/07-08(01)*
- Hong Kong Maritime Museum. (2010a). *About Us*. Retrieved November 21, 2010, from <http://www.hkmaritimemuseum.org/index.php>
- Hong Kong Maritime Museum. (2010b). *Corporate*. Retrieved November 21, 2010, from <http://www.hkmaritimemuseum.org/index.php>

- Hong Kong Museum of History. (2007). *Admissions*. Retrieved November 21, 2010, from <http://hk.history.museum/en/admissions.php>
- Hong Kong Observatory. (2010) *Predicted tides*. Retrieved November 10, 2010, from http://www.hko.gov.hk/tide/estation_select.htm
- Hong Kong Tourism Board. (2010, August 6). *Accessible Hong Kong*. Retrieved November 21, 2010, from <http://www.discoverhongkong.com/eng/trip-planner/accessible-hk.html>
- Hor-Chung Lau, J. (2007, July 19, 2007). In transit: Accessible travel in Hong Kong. *New York Times*, p. 3.
- How Can a Tugboat Pull a Large Ship? (2009). Retrieved November 19, 2010, from <http://www.brighthub.com/engineering/marine/articles/35004.aspx>
- Ingham, M. (2007). *Hong Kong: A cultural history*. New York: Oxford University Press.
- Kidder, L. M. (2007). *Hong Kong*. New York: Fodor's.
- Levathes, L. (1996). *When China Ruled The Seas: The treasure fleet of the dragon throne, 1405-1433*. New York: Oxford University Press.
- Lo, J. (1955). The Emergence of China as a Sea Power During The Late Sung and Early Yuan Periods. *Far Eastern Quaterly*, 14(4), 489-503.
- Magoun, F. A. (1977). *The frigate constitution and other historic ships*. Massachusetts: Bonanza Books.
- Malmberg, L. (2003). Management planning for historic ships. Paper presented at the *First International Conference on Maritime Heritage, Maritime Heritage 2003, March 24, 2003 - March 26, 167-174*.

McConnell, K., Allsop, W., & Cruickshank, I. (2004). *Piers, jetties, and related structures exposed to waves: Guidelines for hydraulic loadings*. London: Thomas Telford.

Olsen, R. (2009). *The world's busiest ports*. Retrieved November 19, 2010, from <http://www.forbes.com/2010/06/07/containers-ports-trade-business-logistics-shipping.html>

Sorum, A. (2007). *Common Types of Boat Anchors*. Retrieved November 19, 2010, from <http://www.myboatsgear.com/newsletter/200788.asp>

The Art of Science and Ship Berthing (2009). Retrieved November 19, 2010, from <http://www.brighthub.com/engineering/marine/articles/47742.aspx>

The Waterfront Center. (2007). *Champions of Waterfront Excellence*. Retrieved November 11, 2009, from <http://www.waterfrontcenter.org/>

What are the Different Types of Repairs Necessary for a Ship? (2009). Retrieved November 19, 2010, from <http://www.brighthub.com/engineering/marine/articles/32481.aspx>

Woods, D. (2009). *Handbook for interactive qualifying project advisors and students*. Worcester: WPI.

Yip, T. L. (2008). Port traffic risks – A study of accidents in Hong Kong waters. *Transportation Research Part E: Logistics and Transportation Review*, 44(5), 921-931.

Appendix A: Sponsor Description

The Hong Kong Maritime Museum (2010) is a non-profit educational institution that serves to preserve Hong Kong's unique and vibrant maritime history through exciting, interactive exhibits. The HKMM is an "independently operated, public museum for the people of Hong Kong dedicated to THEIR maritime heritage and focused on the people, the harbour, and the ships that have created THEIR home – one of the world's greatest port cities" (Corporate). The HKMM was established in 2005 and was opened to the public on September 9, 2005 (Chiu, 2005, p. 1).

The HKMM is in the midst of a relocating to Central Pier 8, which was undertaken with the hope of sparking wider interest in maritime history as well as appealing to a wider variety of Hong Kong visitors. Currently, the HKMM (2010) is located in Stanley Plaza on the ground floor of the historic Murray House, a nineteenth-century building situated on the Stanley Bay waterfront. The HKMM is a part of the well-known retail complex in Stanley Plaza that is accessible by most bus services. The museum exhibits are both interactive and innovative, displaying Hong Kong's rich history of maritime exploration, trade, and naval warfare. The mission statement of the Hong Kong Maritime Museum (2010) is as follows:

"The mission of the Hong Kong Maritime Museum is to stimulate public interest in the world of ships and the sea with particular reference to the South China coast and adjacent seas and to the growth of Hong Kong as a major port and international maritime centre, and in doing so highlight the major developments in and cross-fertilization between Chinese, Asian and western maritime tradition" (About Us).

The Hong Kong Maritime Museum (2010, About Us) has a very simple, yet solid organizational structure. The HKMM has one Chair, Mr. C.C. Tung, who oversees twelve trustees. The Board of Directors led by Chairman Anthony J. Hardy, is composed of Mr. Y.K. Chan, Mr. Andrew Yee Chen, Mr. Kenneth Koo, Mr. M.H. Liang, Prof. Qian Qiang, and Mr. William Waung. Serving as the Museum Director

and our project team's liaison is Dr. Stephen Davies, who oversees the day to day operations and external affairs of the museum. Working with Dr. Davies is Ms. Catalina Chor, who serves as the Executive Director and Curator of the museum. Ms. Chor oversees the rest of the museum staff, consisting of the Curatorial Department and the Operational Staff. The Curatorial Department is comprised of three employees - Ms. Moody Tang (Assistant Curator), Ms. Dorothy Kwong (Assistant Curator of Public Relations), and Ms. Elisa Pang (Assistant Curator of Design). The operational staff is also composed of three employees - Ms. Jesse Chan (Executive Secretary), Ms. Louisa Leung (Accounts Supervisor), and Ms. Kendi Tong (Shop Adviser).

The museum is funded primarily by individuals and organizations within the shipping community (HKMM, 2010, About Us). They include COSCO, one of the world's largest container shipping lines ("Donor Board"). The museum generates income based upon their annual visitation rate. The museum charges a general admission price of HK\$20.00 for adults and HK\$10.00 for children under 18, senior citizens, full time students, and people with disabilities ("Location and Information"). The visitor base of the HKMM is comprised equally of both males and females of varying age. The majority of these visitors are from Hong Kong, with very few coming from mainland China. The museum's average annual visitation is estimated to be somewhere between 35,000-40,000 since its opening in 2005.

Appendix B: What is an IQP?

According to the IQP handbook (2009), an Interactive Qualifying Project (IQP) is a project that examines the intersection of technology and society (Woods, p. 8). The objectives of a successful IQP are to create awareness of the social impact of an engineering decision, cause students to question and evaluate society's beliefs, and to aid in the students understanding of society. These objectives do not set standards for the results presented at the end of a project, or even set tight limitations as to topic of the problem, but rather define what a student should learn in the course of completing the project.

For our IQP, we are attempting to determine the feasibility of berthing a ship for HKMM at Central Pier 8 in Hong Kong Harbour. The technological component of the project is focuses on the sea conditions that the vessel will have to brave. The sociological component is centered on determining what variety of ship should be presented at the museum based on cultural attitudes held by Hong Kong's citizens. These are not the only parts of the problem; however, they offer examples of the spectrum of topics our IQP will attempt to span.

This project is an IQP because it encompasses both technological and sociological components. Not only does our project include both aspects, but each affects the ability to fully understand and act upon the other. For example, if the team does not understand which type of vessel the public wishes to view, it will not matter if said vessel can weather the elements, as too few visitors will be attracted to sustain the exhibit financially. Equally, the project is doomed if an appealing vessel is selected, but is unable to withstand the abuses of being in the harbor. In this case, it would not matter how popular the exhibit became, as it would require repairs so frequently that the exhibit would rarely be open. There is even a possibility that if the analysis is done incorrectly, the boat could sink. As this project contains both sociological and technological components, and forces our group to understand the myriad ways in which the two interrelate, it is by definition an IQP.

Appendix C: Interview Transcripts

Interview with WPI Prof. Forgeng (Museum Curator)

November 29, 2010

Interviewers: Codie Keene and Stephen Lee

Location: Higgins Armory Museum

Higgins Armory Museum Interview: WPI Prof. Forgeng (Museum Curator)

How many years and months have you served your current position as curator?

11-12 years

How many years experience with the Higgins Armory Museum?

11-12 years. Prior to that I served as an independent contractor for several museums, and then I served as an interpreter for the Plimoth Plantation.

Generally, what are your current museum demographics?

Our demographics are primarily composed of school groups and families.

What kind of exhibits do visitors like to see?

-Preferred medium or presentation style?

There is no one preferred presentation style. It is important to capture a breadth of different approaches in exhibits. You want to have something to offer to different developmental levels and interests.

-How do you manage movement within the museum?

Some individuals prefer a guided tour, while others prefer to move at their own pace.

-How do you ensure an exhibit is making the best use of the available space?

Typically, one objective is dwell time. It is important to observe how long the visitors stay at a particular exhibit as a factor related to space. This is a ratio of time versus square footage.

Are you facing a decline in visitors over the years? If so what have you done to reverse this trend and attract not only new visitors, but also retain your current visitors?

The current economic state is a real challenge for small to mid-sized institutions. The biggest issue is the decline in school visitation due to educational cuts. A good museum is always reinventing itself. The bottom line is if you don't change, you're going to go extinct.

How are exhibits organized with third parties?

There are different needs depending on whether it is a school group or a family. Students are driven by curriculums. School curriculum dictates what students need to learn based on state regulations and MCAT's. School groups require guided tours and activities such as written scavenger hunts to engage the students. A structured, programmatic museum experience is necessary.

How are travelling exhibits advertised?

Temporary exhibit space is limited therefore we don't have room to accommodate travelling exhibits. However, we do send exhibits out. These exhibits are market driven and controlled by an outside agency. These outside agencies have a knowledge of market demand and help choose which exhibits would be worth sending out.

-Is one type of advertisement more effective than another for a given exhibition?

Print, web, billboards, and occasional radio and TV advertisements are used. As far as effectiveness goes, I would guess that web based advertisements are the most cost beneficial due to their very low cost.

-Average advertising costs?

Cost varies greatly but TV and radio are of the most expensive forms of advertisement, while the internet is extremely inexpensive and readily available. The best marketing of all is word of mouth. The word spreading brings people in.

Do you think a permanent "signature" exhibit would be helpful to your museum?

Branding is really important. A signature exhibit really captures people's interest, which is very important. We have three main exhibits that visitors typically enjoy. The first is the Knight and Dog

Armor in the front lobby. The second is the jousting armor which is set up as a full scale scene. This is a very compelling exhibit. The third is the Knights exhibit which was created on a shoe-string budget. This is a very successful exhibit that was created with a very limited budget of a few thousand dollars. A major factor preventing us from having a signature, blockbuster exhibit is our threshold of size. Such an exhibit requires a large staff and floor space. Our small area makes it difficult to mount an exhibit with that much pulling power. A shortage of staff also makes such an exhibit nearly impossible. One has to draw in outside sponsorship to make it happen.

How is your museum funded?

Our museum is partly earned income, partly donated money and grants, and partly endowment.

If private, how do you maintain quality exhibits while managing expenses?

It is important to gain sponsorship for exhibits by marketing. Without such sponsorship it is very difficult to accumulate the necessary funds for a successful exhibit.

Has your museum ever moved location, and if so, what kinds of challenges did you face?

We have been at our current location since 1930. However, we did contemplate moving downtown. In debating on whether or not to move there were several factors, the most obvious of which were logistical issues. Less noticeable are issues such as branding. It is important to brand your new location so that people think of you in a different way at a new location. People are attached to your current location and a move may cause upset for them. Location is a challenge for us. We are isolated from the central core of Worcester and we are difficult to find.

Do you have any suggestions for the HKMM and its current situation?

Buy in from the community is very important and is analogous to our current travelling exhibits. What would make the exhibit worthwhile if the community wasn't truly invested in it? The Board of Trustees represent those invested in the museum. Success depends on the trustees as they must believe in the exhibit and be enthusiastic about it. They are the ones with connections in the business world. This

exhibit must connect the past to the future as a symbol of how Hong Kong can consolidate its pride and history. Sell it as a way to consolidate the community and promote identity. This ship needs to be a hallmark for Hong Kong and a representation of maritime activity. This exhibit can also be used to install confidence in what Hong Kong firms can provide.

Thank you very much for your time today. We very much appreciate it.

If you have any follow up questions do not hesitate to call me or email me as I am glad to help.

Interview with Peter Arenstam of the Mayflower II

Date: 12/3/2010

Time: 1-3 PM

Location: Plymouth, MA

Interviewers: Codie Keene and Mitchel Wilkinson

Note: This is not a verbatim transcript, due in part to the limitations of the recording device used to conduct the interview, and the nature of the interview itself, which included a walking tour of the Mayflower II following a formal question and answer session. This is in accordance with our request, and in pursuit of additional experiential knowledge. We truly thank Mr. Arenstam for his time, and for his generosity in the sharing of his expertise. Any errors or omissions made in this transcript are solely the fault of our team.

Legend: PA-Peter Arenstam

CK-Codie Keene

MW-Mitchel Wilkinson

CK: What is your current position, and for how long have you held the position?

PA: I've been at Plimoth Plantation for just about 20 years now, and my title is Manager of the Maritime Artisans. We are the department that maintains and restores the Mayflower II, is responsible for sailing the ship, as well as training new crew and volunteers. We also produce maritime programming.

CK: What challenges are faced when moving a ship of this size?

PA: Mayflower does not have an engine, so we have to contract with a tugboat, which is the first issue. We've used the same tugboat for the last 30 years. Also, she's a large wooden 17th century style vessel that's not designed to be towed per se, so turning and maneuvering is difficult. She (Mayflower) is very forward, has a bluff bow and a high stern cap with a long, straight keel, so she'll turn in to the wind and go in a straight line forever, but turning and maneuvering can be a challenge. Another issue for us is that, since Mayflower II is a very well known, locally, nationally, internationally known vessel, anytime we move the Mayflower from the pier, and away from view, we disappoint a lot of people.

MW: On the technical side, if you were able to retrofit the Mayflower to make it easier to tug, not considering the aesthetics, in what way would you go about that? What devices or methods might you use?

PA: I would not consider putting an engine in, if that's what you're thinking, because moving with a tug, while awkward, is easier than moving her on her own. One thing I would consider is an auxiliary motor boat to help maneuver. We actually have a 17' motor boat, a work boat, which we built here a few years ago with volunteer help, which we sometimes use as a push boat. We turn Mayflower twice a year during the season here at the pier, so every four months or so, to keep her weathering evenly, so we use that work boat when we cast off lines, to push and to maneuver, and to sort of act as a guide.

CK: What can you tell us about the berthing and mooring logistics?

PA: Mayflower was sailed to this pier from England, where she was built, in 1957, and has essentially been on this pier since then. We have two gangways to allow access for visitors (per Coast Guard regulations), and floating in the water, we have a camel, which is a floating fender to keep the ship from moving into the pier. Ours is a log, maybe 18" in diameter, 50-60 feet long, with old car and truck tires on it for floatation and absorbing shock. This isn't an ideal fendering system, but it does work. We've looked into using a camel like the Navy uses, which is a large inflatable device, which can be moved more easily. Also, outboard of the ship are two sets of dolphin pilings, so large, anchored pilings, basically a cluster of logs, one fore and one aft, which help keep the ship stationary. We have a set of 2.25 inch diameter mooring lines, permanent mooring lines, made of nylon, which are shackled to pier and to the ship. These are pretty specific lengths to keep the ship from moving fore and aft in her berth. One thing to bear in mind about the security of the ship is the tidal range, so the difference between low and high tide, and the slack in those lines, is a part of the equation. Our range difference is between 8-10 feet, which is significant, so you have to consider that.

MW: To follow up, regarding those regulations about embarking and disembarking, what more can you tell us?

PA: Mayflower is certified for up to 49 passengers, and is classified as "substantially a land structure", meaning your ship doesn't travel, though we are able to travel. To do be classified this way, you need a land line and a fire system that connects to the local fire department, essentially a local safety network, so that in an emergency, the fire department comes, not the Coast Guard or the harbor master. We have to follow the safety requirements of a structure you would find on land, including occupancy, entrances and exits, firefighting equipment, lighting, and those sorts of things, to let people on board.

CK: What type of maintenance is required?

PA: Ha! Ongoing and relentless....I would say a wooden vessel is the most labor intensive, particularly a period ship, a 17th Century ship, but the material type will determine the maintenance schedule and type. There is a staff of 3 that work here year-round on maintenance, but we could easily use 5. There's painting, caulking, framing, planking, sails which rot on the yards (ours are linen canvas), etc. But depending on the type of exhibit and the material types, anything exposed to the weather, constantly, has to be protected. And we have to consider the visitors, who we welcome, but by being on the ship, can do damage to it. It's one more impediment

MW: What can you say about dry-docking the Mayflower II, or the procedure when work needs to be done under the water line?

PA: We dry dock every other year, which is a six hour tow down to Fairhaven, which also relates to our Coast Guard inspection. This year is one of those years, and this all happens after the season, but requires down rigging and preparing to travel, which can be a long process before disembarking. We dry docked every year for six years or so, to catch up on some maintenance issues, but it's currently every other year.

CK: What are the costs related to maintaining the ship?

PA: A dry dock bill minimum, with hauling, cleaning, painting, and re-launching, is probably \$20,000. The most we've ever spent, per dry docking, to my knowledge, is around \$80,000. Again, bear in mind, these costs are for an older wooden vessel and for the labor market here in the Northeast.

MW: How do you screen outside contractors to do work? Also, how do you screen and train volunteers?

PA: For dry docking and maintenance, there is a bid process, where we contact two or three local shipyards which are capable of docking us (most yards are not), all of which we visit, just to get a good bid. Over the years we've visited a number of yards and have found different yards that are better at different types of work, so we on the staff can usually agree which dock would be best based on the job. We do have a long-standing relationship with one yard which has a strong carpentry and shipwright division, and who know our techniques and our needs well.

We will use volunteers of any skill level. As a trained shipwright for 20 years, or more like 30 now, one of my roles is teaching, as well as using any rigging or carpentry background the volunteers may have to make them the most useful to the Mayflower. For background, I have a degree in philosophy from Bates College, and went to boat building school after that, so there is an emphasis in teaching these skills, and expanding any abilities the volunteers already have.

MW: How many volunteers do you get per season?

We get 4-6 volunteers regularly, I would say on a weekly basis, during the season, but when we sailed last, in 2007 we sent out a call for volunteers had 65 volunteers show up and go through a training program.

CK: How are your tours conducted?

PA: We have a first person program during the seasons, which has actors serving as passengers or other roles, and then third-person interpreters, either tour guides or docents to answer questions from a modern perspective. Another part of that is the Maritime Trades program, so as we work, we answer questions. All of the tours are self-directed, and we encourage people to ask questions. Someone from guest services will give a brief orientation of who is on board, but otherwise experience varies based on the questions, and their visit is really as good as they make it. A person who just wants to look and leave may be done in ten minutes, while a person who asks good questions will usually stay between 30-45 minutes. Visitors who stop and engage generally have a better experience. We also have an on-dock exhibit which emphasizes the three things I mentioned, the immersion, the modern view and then the trades, and an exhibit after leaving the ship, which is currently about provisioning a 17th Century ship, but which can vary during the season.

MW: In your experience, what is the ideal group size? Is it the more the merrier?

PA: Definitely not. We let 20-30 people on a time, and when dealing with school groups, it has to be staggered. When it just families who come and go in small groups, there is a much more fluid interaction than when it's done on a school kind of schedule. During group season, when there are bus-loads of kids, we'll have one group start on the half deck and one on the main deck, and then have them trade once both groups get a good look around, then have those kids get off to let the next bus load on, but that can be rushed, and not as meaningful.

MW: Is there an average duration? Does that vary with any other factor, like age or gender?

PA: Every other factor, to be honest with you. If you have someone who is focused on history, they may stay half a day, where if you have someone with a little kid tugging at their arm, they'll stay for 20 minutes. An author has stayed for two days before. We estimate the average is 30-45 minutes.

CK: What is the cost of the tour?

PA: Ten for an adult, seven for children, for the single site, good for two days.

MW: What percentage of revenue comes from ticket sales?

PA: About 80%, with the rest coming from a combination of donations to Plimoth Plantation from groups or individuals, government grants, and some other sales within the Plantation itself.

CK: Have you ever considered taking passengers out?

PA: No, not generally, in that we do well here at the pier, and the added cost of getting underway is difficult to recoup with just 49 passengers, as well as the geography of the harbor. We can also only travel on a high tide, so we are very limited in that way.

MW: What provisions are there in the case of inclement weather?

PA: We've had hurricanes in the past, and in that case, we add a second set of mooring lines, as well as what we call on-shore mooring lines to concrete blocks so we can haul the boat up if we have to,

though this isn't usually necessary. We also add extra camels and fenders to protect the dock. That in my experience is enough to keep the boat in place and keep everything secure.

CK: While visitors are on board the ship, what safety considerations are there?

PA: With regard to maintenance, we try to let people know what's going on if we're going to be working overhead or if we're going to be working with paint or tar or something like that, and to get that information to Guest Services. We also will rope off areas that are simply too dangerous to be, though we try and keep that to a minimum during the season.

This concluded the portion of the question and answer session that we could record via tape (30 minutes). What follows is taken from written notes.

CK: How do you market your ship to the public?

PA: Number one is word of mouth; people visiting and telling their friends about it. We also do a lot of print advertisement, particularly around the holidays. We also get a fair bit of media coverage around the holidays, which is handled and coordinated by our PR manager, who may reach out to various news outlets. For example, the Boston Globe has said this week they may be interested in following the Mayflower the next time it is in dry dock, so all of that is transferred to her. We also have a website with a research center which has information on visiting us. I would say within the organization, PR doesn't get the financial backing or the attention it deserves.

CK: What are your current visitor demographics?

PA: Speaking very broadly, the larger the greater the distance away from Massachusetts, the smaller the visitor base tends to be. The largest groups tend to be school groups with third and fourth graders studying colonial history. We have as a part of our outreach efforts groups of actors who go to classrooms in costume to teach colonial history. We can also supply teachers with materials, which naturally encourage them to visit us, particularly if they have come before and had that be something their students have enjoyed and learned from. There are also arranged groups, done through the main office, which include a lot of foreign visitors. Within that I would say we get the largest number of Brits, then Japanese, then other countries, but truly all over the world.

CK: How do visitors give feedback?

PA: We use comment cards, which we keep and display by the ticket office, which people can fill and out, and which we do read on a regular basis. Also, we get letters and e-mails from people who have come, both positive and negative, which we keep and review. In the last few years, we have really put a re-emphasis on visitor service, which I think has been very good.

MW: What is the one thing you are proudest of, and, inversely, what is the one thing you would change if cost/authority were no object?

PA: What I am proudest of is keeping a 57 year old ship safe, boardable, and seaworthy, through our maintenance. What I would change is the infrastructure of the site. Having the service facilities and repair shop 2.5 miles from the ship itself just doesn't make any sense. Also, the Mayflower, as opposed

to Plymouth Plantation, should have its own internal staff structure rather than having to communicate through a group that has their own exhibit and concerns. The communication can sometimes be awkward.

This concluded the formal question and answer session.

Appendix D: Mayflower II Case Study

In considering the feasibility and development of a new “floating” maritime exhibition for the HKMM, it seems prescient to consider other similar exhibitions elsewhere in the world, so as to establish a working model for our group to emulate. Having recently completed its 53rd year of operation, and enlightening an average of 200,000 annual visitors, our group could conceive of no more successful a candidate to study than the Mayflower II, docked at the Plimoth Plantation in Plymouth, MA. Our group was fortunate enough to tour the vessel in December 2010, following the close of the Mayflower’s visiting season, and to interview the Mayflower II’s Director of Artisans, Mr. Peter Arenstam, whom we wish to thank for the privilege.

In reflecting upon this experience, and in order to establish a working model, several key points merit consideration. The first and perhaps most significant of these is the organizational challenge presented by the continuous monitoring and upkeep of an historic vessel. To this end, the Mayflower employs three highly skilled craftsmen on a full-time, year-round basis to maintain the vessel, though Mr. Arenstam notes that this number could easily be five. Though in part this is reflective of the labor intensive nature of a wooden vessel, particularly a vessel more than a half-century old intended to reflect the shipbuilding practices of the 17th Century, this also speaks to the necessity of maintaining the ship during the viewing season, when wear is accelerated by the increased deck traffic. In combating the challenge of completing necessary maintenance work without significantly hindering the freedom of movement of the Mayflower’s guests, the routine maintenance of the Mayflower has been incorporated into the visiting experience itself, as guests are encouraged to ask questions of the servicing crew, who are trained not only in the technical trades, but also by museum staff as to how to interact with guests. Moreover, as an extension of this, the Mayflower II operates a volunteer program, where interested persons may learn rigging, carpentry, and other shipboard skills, and can contribute directly to the

maintenance of the vessel, provided a member of the staff supervises. This, it is worth noting, helps to offset the great cost of maintaining an historic vessel, while simultaneously advancing knowledge of maritime history within the general public. While a program of this type demands a particularly knowledgeable and gregarious maintenance staff, it is the experience of Mr. Arenstam that often, tradesmen are more than willing to share their experience and skills, stemming from their love of the craft of shipbuilding itself.

Further regarding the finances of the Mayflower II, it must be noted that the admission price for the vessel experience (\$10 for adults, \$7 for children age 13 and under, with possible discounts for seniors) is not tied to that of the Plimoth Plantation, and in point of fact, falls under a different internal command structure. While Mr. Arenstam noted some difficulties in the communication between those working at the Plantation and those working with the Mayflower II, it is also significant to observe the revenue generated by the Mayflower II is distributed between both exhibits. While this may be advantageous to the Plymouth operation as whole, naturally the diversion of resources from the ship itself (given a minimum dry docking cost of \$20,000, incurred on a biyearly basis) is the cause of some consternation, and additionally muddles the question of long-term exhibit solvency. Similar to the HKMM, the Plimoth Plantation depends both on admission fees and private donations to remain open, though in contrast, the Mayflower II does receive several government grants, renewed as necessary. This government funding, but not on an exclusive basis, would be one path to explore with an historic vessel housed and operated by the HKMM.

In accounting for visitor experience while onboard a stationary vessel, several factors play into the overall feel and flow of the exhibition. First, and perhaps most notably, is the time in which the material is presented. In the case of the Mayflower II, actors dressed in period garb are trained to go

about the daily activities of their historic counterparts, and to answer questions in a manner similar to their character so as to enhance the realism of the viewing experience, and to transfer knowledge from what appears to be a first hand source. While this often has a more dramatic effect on schoolchildren than adults, in terms of the experience, the concept of presenting material from a first person vantage point, rather than viewing the vessel and contents purely as supplanting an historic artifact, is one well worth considering. In support of this type of period immersion, Mr. Arenstam notes that in addition to the vessel itself, the objects contained on the vessel are of paramount importance, as in their absence, the vessel is more a shell than a piece of living history. Second, the order in which visitors view items can have a significant effect on the overall impact of the exhibition. While a visitor's experience aboard the Mayflower II is largely self-directed (e.g. there are no formal tour guides leading groups, and visitors may chose to remain in one area for a greater length of time than another), Mr. Arenstam has noted that by beginning on the Mayflower's half-deck, then advancing to the main deck, and finally proceeding to the galleys and cabins below deck, visitors are more keenly aware of the structure of the ship in relation to its function, and in re-visiting areas upon their departure, have an enhanced appreciation of the ship's design. Moreover, by suggesting this viewing order to guests and limiting the number of persons on the ship to below the maximum legal occupancy, a visitor's feeling of crowding is minimized, thereby enhancing the overall experience. Finally, Mr. Arenstam notes that in considering the average visit length (between 30-45 minutes for the Mayflower II), ultimately, factors beyond the museum's control, as for example a crying child or poor weather conditions, often determine this duration, rendering it a meaningless statistic with regard to information transfer and overall experience. In combination, these factors must be considered in developing a new exhibition, as well as maintaining the quality of experience for a repeat visitor.

In discussing issues of safety and legality, Mr. Arenstam noted that there is a distinction in US maritime law between a touring vessel (e.g. a vessel operating under a fixed schedule between points,

and moving under its own power) and a vessel which is “substantially a land based structure”. The essence of this difference in definition lies in whether the emergency network employed by the vessel exists primarily at sea or on land. For instance, in the case of a fire aboard the Mayflower II, the relevant authority for the acting captain to contact would be the Plymouth Fire Dept., not the Plymouth Harbourmaster or the Coast Guard. This definition extends to other areas of law, including lighting and accessibility compliance, but primarily concerns emergencies and the type of mooring and fendering system employed. Depending on the preferred experience of patrons (e.g. stationary or touring), it is significant to be aware of these distinctions, and to comply with established regulations.

In sum, our group’s time at the Mayflower was both a wonderful historic experience, and a boon in developing a model for comparison to any exhibits proposed or implemented by the HKMM. While it is impossible to determine if any vessel experience designed and/or recommended by our group will stand the test of 50 years while continuing to thrive, as the Mayflower II has, this certainly seems a worthy goal.

Appendix E: Questionnaire

The information given in this survey is confidential as defined by law. Your participation is strictly voluntary and no individually identifying data will be collected or reported.

This survey is being conducted on behalf of the Hong Kong Maritime Museum to gauge interest in possible museum exhibits. Please circle your responses (choose only one).

- 1) Were you previously aware of the Hong Kong Maritime Museum?

YES [是] / NO [不是]

- 2) Would you visit the Hong Kong Maritime Museum if it were located at Central Pier 8?

YES [是] / NO [不是]

- 3) Which type of historic vessel would you be most interested in visiting as a museum exhibit?

Fishing

Ferry

Junk

Military/Warship

Tug

- 4) Would you be more likely to visit the Hong Kong Maritime Museum if it had the vessel you selected?

YES [是] / NO [不是]

- 5) For the type of vessel you selected above, what is the maximum admission fee you would be willing to pay to tour the vessel?

10-20 HK

21-30 HK

31-40 HK

41-50 HK

Over 50 HK

Please circling your responses (choose only one):

Please specify your gender:

Please specify your age range:

Male / Female

12-20 21-40 41-60 61-80 Over 80

Please specify why you are in Hong Kong:

Resident

Visiting Family/Friends

Tourist/Vacation

Business Trip

Other: _____