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A CASE STUDY IN THE APPLICATION OF HUMAN-CENTERED DESIGN TO THE *JAMES CRAIG*

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Abstract

The evolution of design, in particular the emergence of participatory design, is challenging the way designers work with users to develop effective solutions. This thesis examines the practical application of IDEO's human-centered design process to the development of an effective solution for the *James Craig,* an operational historical vessel, using a participatory design approach.

The intent of the case study was to ascertain whether or not *James Craig* volunteers could successfully participate in the ideating, conceptualising and prototyping stages of the design process, to develop a solution that works within the *James Craig's* operational requirements and heritage listing restrictions. It also aimed to discover whether or not involving volunteers in the process could help in securing funding for the implementation of the desired solution.

This thesis discovered that IDEO's human-centered design process was instrumental in the development of the final solution of an exhibit which communicated the *James Craig's* story and value to its visitors outside of the guided tour format. Volunteer participation in the process via a participatory design approach resulted in dynamic ideas, support for a new approach and the opportunity to progress the project into an implemented solution which is hoped to contribute to the ongoing successful operation of the *James Craig*.

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1. Introduction

The evolution of design, in particular the emergence of participatory design is challenging the way designers work with users to develop effective solutions. In order to ascertain the benefits of using a participatory design approach, the following case study delves into the application of a human-centered design process to the *James Craig*.

1.1 Thesis Background

The Sydney Heritage Fleet, based in Sydney, Australia, plays a crucial role in the research, acquisition, conservation, restoration and operation of, and education about Australia's continuing maritime history. Its 1200 members and volunteers restore, operate and maintain the fleet, preserving traditional technical methods and skills. Its operations are funded through donations, membership subscriptions and income from vessel activities such as charters and tours (Sydney Heritage Fleet, n.d.a). The fleet currently comprises of 10 historical vessels, 55 small heritage boats and a large collection of maritime engines (Sydney Heritage Fleet, n.d.a). The 1874 iron barque, the *James Craig* (launched as *Clan Macleod*) is the fleet's largest restored vessel (Sydney Heritage Fleet, n.d.b) and is a significant and exceptional asset to Australia's maritime history (Sydney Heritage Fleet, n.d.b).

Unlike many of the other operational tall ships in Australia, the *James Craig* is a restoration rather than a replica or modern ship built after the 20th century. In 2003 she won the World Ships Trust's International Maritime Heritage Medal for authentic restoration and is one of only four operational barques worldwide still capable of sailing. Of these four vessels, the *James Craig* is the only one in the Southern Hemisphere, and the only one of whom regularly takes passengers to sea (Sydney Heritage Fleet, n.d.b).

Figure 1. The restored 1874 iron barque, the *James Craig* on her way to broken bay (Toghill, 2013, p.86).

At present the *James Craig* is used for a variety of activities to help fund her continued maintenance. When alongside at Wharf 7 in Darling Harbor, Sydney, she is a museum vessel that forms part of the Australian National Maritime Museums' *big ticket* visitor pass (Australia National Maritime Museum, 2013). According to the Australian National Maritime Museum (2013) the story of the *James Craig's* restoration and rebirth is "even more extraordinary than its earlier life" taking almost 40 years to complete at an approximate cost of $A30 million (Sydney Heritage Fleet, n.d.b).

As the *James Craig* is maintained and operated on donations and revenue raised from her activities, it is essential that when the ship is open as a museum, visitors enjoy their experience onboard and engage with her past and present stories. However, at present the *James Craig* lacks a comprehensive, uniform and professional way to communicate her story and value to visitors outside of the guided tour format.

2. Preliminary research into human-centered design

It was identified that the complex operating and social environment of the *James Craig* called for a more wholistic approach to design than could be delivered by a

typical creative graphic design process. As such, research was conducted to understand the field of human-centered design in order to assess its suitability as an approach for designing a solution that worked within the operational constraints and requirements of the *James Craig*.

2.1 What is design as an activity?

Design is a complex human activity that consists of the 5 key elements of process, object, content, context and actor. It involves a designer or design team (actor) generating solutions (content) to solve a problem (object) by structuring and then following a set of activities (process) whilst working within the context of the problem they are trying to solve (Dorst, 2008). The series of meta-activities performed by designers builds their ability to perceive, interpret, structure and solve problems (Dorst, 2008).

According to Dorst (2008), the design process is a robust tool that empowers designers to tackle complex problems, however the art of design lies in the designer's ability to integratee the process with the content, within the context in which the design is taking place. As such designers tailor their approach to every design situation by determining their role in the project, building design teams with the right skills and knowledge and tailoring their engagement with stakeholders (Dorst, 2008).

2.2 The changing practice of design

Design activities evolve as design professionals adapt the way they work to solve the problems of the time. Globalisation, sustainability and the coming of the digital age have lead to an enormous shift in the complexity and the kinds of problems designers need to solve (Dorst, 2008). This has resulted in a fundamental shift from designing categories of products to designing for people's purposes (Sanders & Strappers, 2008).

In traditional design disciplines the designer gains the skills needed to expertly generate and give shape to products such as branding, household items and interior spaces. The emerging design disciplines however, center around societal or individual's needs by focusing on designing for a purpose. This requires designers to take a different approach as they are working with larger scopes of inquiry (Sanders & Strappers, 2008).

2.3 The human-centered design landscape

Since the 1970's designers have been moving increasingly closer to the users they are designing for by practicing collective creativity in the field of human-centered design (Sanders & Strappers, 2008). Sanders (2006) states that human-centered design can be lead by two differing design research approaches, design-led and research-led, and two differing mindsets, expert or participatory, as depicted in **figure 2.**

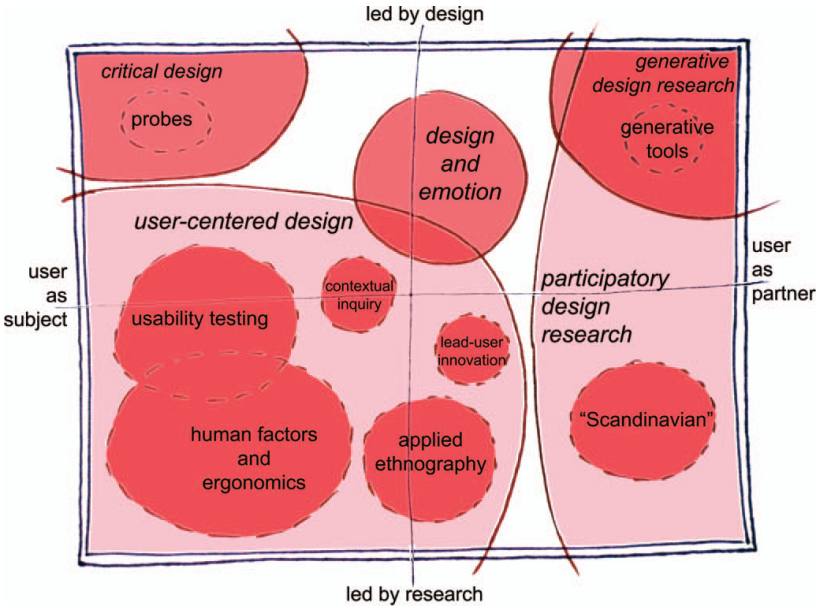


Figure 2. The human-centered design research landscape as practiced in the design and development of products and services. (Sanders and Strappers, 2008, p.6).

Design-led research uses tools and methods introduced from a design practice perspective, whilst research-led research uses tools and methods introduced from a research perspective (Sanders, 2006).

The expert mindset is about applying specialized skills and expertise to create things to be tested by users where as the participatory mindset is about researchers or designers inviting the people who will benefit from the design into the design process as partners, allowing them to be co-creators (Sanders, 2006). Embracing the participatory mindset is difficult as it challenges the 'expert' mindset that is so prevalent in business today (Sanders & Strappers, 2008). As problems become more complex in the future, designers and researchers will need to learn to work between the expert and participatory mindsets to achieve the best results (Sanders, 2006).

2.4 User-centred design versus participatory design

The two main fields of practice within human-centered design are user-centered and participatory design. The user-centered design approach, which became widespread by the 1990's (Sanders as cited in Sanders & Strappers 2008, p.10), approaches collective creativity from the viewpoint of an expert mindset. It is research-led and defines the user as an object of study. Users provide opinions on concepts generated by others or are observed and asked questions when responding to test stimuli (Sanders, 2006; Sanders & Strappers, 2008). The activities, tools and methods that fall within the zone of user-centred design originate primarily from the applied social and behavioral sciences (Sanders, 2006).

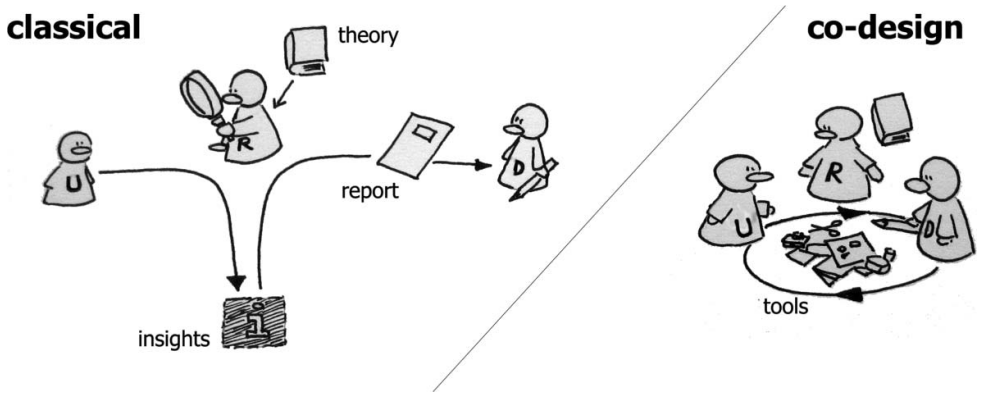


Figure 3. Role of designers, researchers and users in the classical user-centered design approach and participatory co-design approach (Sanders & Strappers, 2008, p.11).

The user-centered design approach is becoming increasingly unable to address the scale and complexity of modern day problems. As a result, designers are now placing more emphasis on the discovery phase at the front end of the design process in order to better inform the design decisions they make (Sanders, 2006; Sanders & Strappers, 2008). The front end, or discovery phase, involves a series of activities that build an understanding of users and their environment to determine what should or should not be designed (Sanders 2006; Sanders & Strappers 2008). This is then followed by a more traditional design process where ideas are generated and concepts are developed for prototyping before releasing a final product (Sanders, 2006; Sanders & Strappers, 2008).

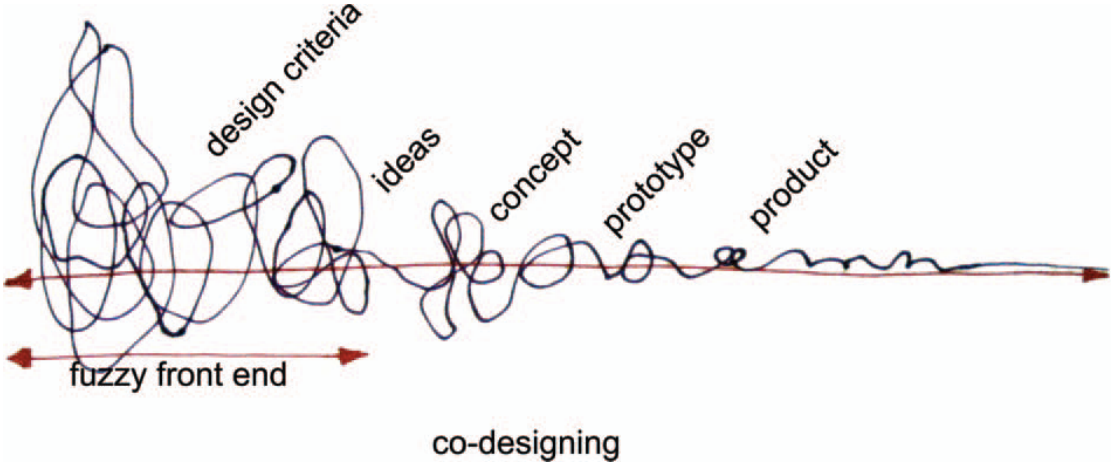


Figure 4. The growing front end of the design process (Sanders & Strappers, 2008, p.6).

Participatory design can be research-led or design-led and approaches collective creativity from the viewpoint of a participatory mindset (Sanders & Strappers, 2008). When provided with the appropriate tools needed to express themselves (Sanders & Strappers, 2008), people without design training are able to work with designers during the ideating, conceptualising and prototyping stages of the design process (Sanders & Strappers, 2008). This is possible because all people are creative and simultaneously apply the four levels of creativity; doing, adapting, making and creating to different activities in their daily lives, as can be seen in **figure 5.** (Sanders & Strappers, 2008).

Level	Type	Motivated by	Purpose	Example
4	Creating	Inspiration	'express my creativity'	Dreaming up a new dish
3	Making	Asserting my ability or skill	'make with my own hands'	Cooking with a recipe
2	Adapting	Appropriation	'make things my own'	Embellishing a ready-made meal
1	Doing	Productivity	'getting something done'	Organising my herbs and spices

Figure 5. The four levels of creativity in the context of cooking (Sanders & Strappers, 2008, p12).

2.5 IDEO's human-centered design process

The global design and innovation company IDEO (IDEO, n.d.) employs a human-centered design process that shares many similarities with the modern day design process depicted in **figure 4.**, and offers a unique approach to problem-solving (IDEO.org, 2015) that can be applied to a diverse range of challenges (IDEO, 2015b) to create solutions that are desirable, feasible, and viable (IDEO.org, 2015). It consists

of the three distinct phases; Inspiration, Ideation and Implementation, which draw upon divergent and convergent thinking to create effective solutions (IDEO, 2015b).

The *inspiration phase* involves learning directly from the people being designed for (IDEO, 2015d) which is used to create meaning, generate ideas and test possible solutions in the *ideation phase*. The *implementation phase* involves realising the solution identified and taking it to market (IDEO.org, 2015).

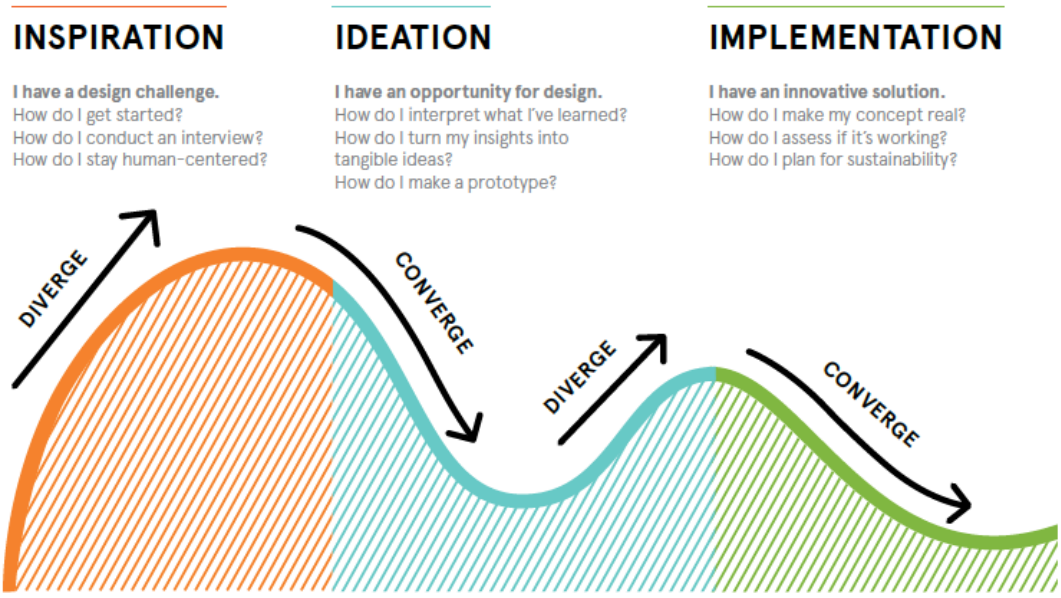


Figure 6. IDEO's human-centered Design Process (IDEO, 2015b, p.6)

IDEO's human-centered design process is not intended to be linear as it should be moulded to the unique characteristics of each project (IDEO.org, 2015). As such, projects may loop back through each or all of the phases during their lifespan as ideas are refined and new directions are explored. This approach differs from typical linear milestone-based processes (Brown & Wyatt, 2010) and allows designers and stakeholders to move away from an over-reliance on rational and analytical thinking, which is prevalent in many other conventional problem-solving practices (Brown & Wyatt, 2010).

IDEO's design process is accompanied by a field guide containing 57 methods that can be applied to each project on a fit for purpose basis. These methods help the designer to keep the people they are designing for at the centre of their work by focusing on users at all times. This results in solutions that are based on people's

actual needs and which work within the environment that sparked the original problem or opportunity (IDEO.org, 2015).

3. Research questions

Upon concluding the initial research it was decided that human-centred design, in particular IDEO's human-centred design process, showed potential to provide a wholistic design approach that could work within the complex operating and social environment of the *James Craig*.

3.1 Working within the social environment

The *James Craig* has over two hundred and fifty dedicated volunteers with a vested interest in the ship. Many of these volunteers have been involved in creating the current visitor experience and are attached to the way things are done at present. As this project aims to leverage an unrecognised opportunity to better communicate the *James Craig's* past and present story, getting buy-in and acceptance of the project from volunteers will be crucial to secure funding and on-the-ground support for the implementation of the recommended solution.

According to IDEO, collaboration is an important component of the human-centered design process because diverse groups of people are able to bring fresh perspectives (IDEO, 2015h) and encourage divergent thinking (Brown & Wyatt, 2010). As such, involving volunteers in the ideation phase will be beneficial to the outcomes of the project because they have a great deal of knowledge of, and a high level of passion for the *James Craig.* By allowing them to participate in the process they may develop a sense of ownership for the solution that is likely to translate into support for the project outcomes.

Therefore the questions this thesis aims to answer by involving volunteers in the project through the use IDEO's human-centred design process are:

1. If provided with the appropriate tools to express themselves, can volunteers successfully participate in the ideating, conceptualising and prototyping stages of the design process?; and
2. Will involving volunteers in the design process help in securing funding for the implementation of the solution?

3.2 Working within the operating environment

As well as operating as a museum, the *James Craig* participates is a variety of other activities such as sailing, charters, function hire, history tours and community programs. She also regularly goes to sea in the form of day sail adventures, charters, and voyages and participates in youth development programs (Sydney Heritage Fleet, n.d.b; Sydney Heritage Fleet, n.d.c). This combination of activities in conjunction with heritage listing restrictions creates a unique and complex operating environment that any solution developed needs to work within.

As IDEO's human-centered design process builds an understanding of users and their environment in order to harness existing challenges and turn them into opportunities for design (IDEO, 2015g), it should help to determine what should or should not be designed and how.

Therefore the question this thesis aims to answer by using IDEO's human-centered design process to create a solution is:

3. Can IDEO's human-centered design process assist in developing a solution that works within the *James Craig's* operational requirements and heritage listing restrictions?

4. Developing a fit for purpose design process

In order to effectively answer the research questions a fit for purpose design process was developed based on IDEO's human-centered design process as can be seen in **figure 7.**. This process consists of the inspiration and ideation phases, as it was decided that the implementation phase was out of scope due to its dependency on funding. Volunteers will be brought into the process to co-design the solution during the ideation phase.

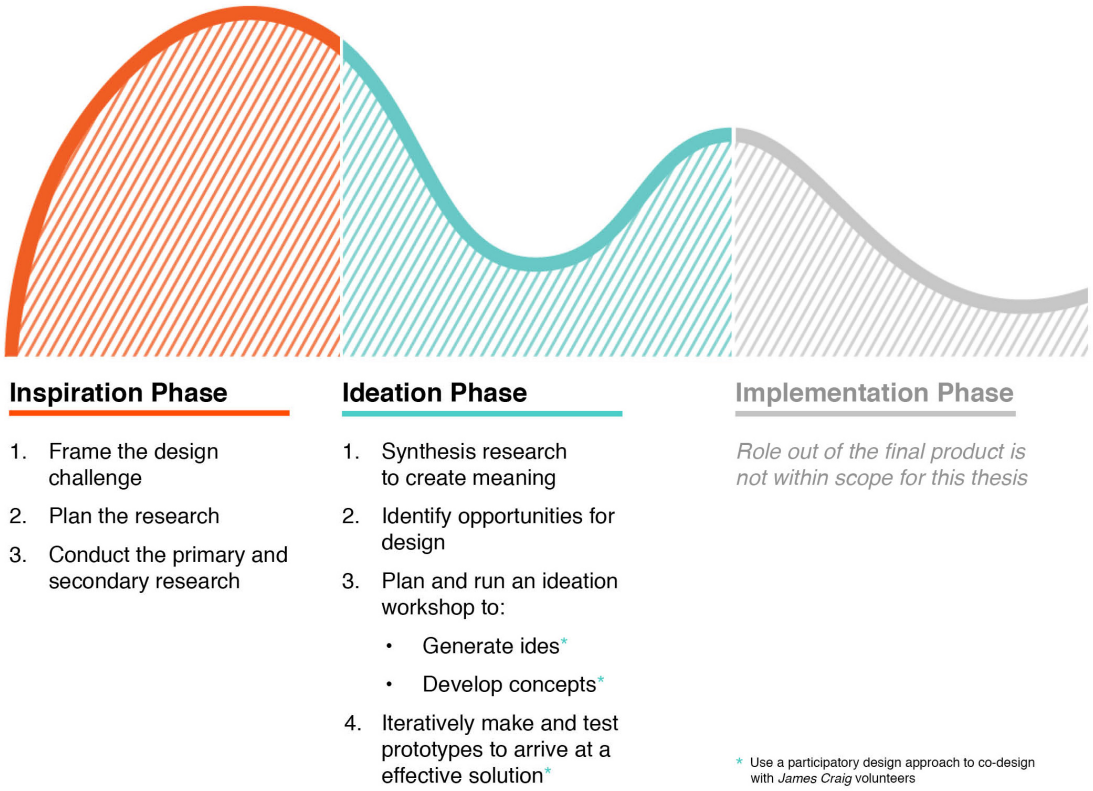


Figure 7. Fit for purpose design process created using IDEO's methodology as a base (IDEO, 2015b).

The following sections detail how this fit for purpose version of IDEO's human-centered design process and adjoining methods were applied to better communicating the *James Craig's* past and present story.

5. Inspiration phase

The inspiration phase involves an in-depth exploration of the environment that sparked the problem or opportunity at the centre of a design project. Typically, this begins with the establishment of a brief, or design challenge as it is referred to by IDEO (2015a), followed by the development and execution of a research plan (Brown & Wyatt, 2010).

5.1 Framing the design challenge

The design challenge provides a framework to guide the design process (Brown & Wyatt, 2010) by identifying the target audience (IDEO, 2015a) and providing a set of mental constraints the designer needs to work within (Brown & Wyatt, 2010). Framed

as a question, it allows for the generation of a variety of possible solutions by focusing on an ultimate impact rather than stating a problem.

Based on the original intent of increasing visitor engagement with the *James Craig's* past and present story, the following design challenge was settled upon:

> How might we inspire our visitors to care about the future preservation of the *James Craig*?

This design challenge aims to generate solutions that inspire visitors, the target audience, to care about the future preservation of the *James Craig*, in the hopes their 'caring' translates into donations to support her ongoing preservation.

The design challenge is also likely to resonate with volunteers due to their passion for the conservation, continued restoration and operation of the *James Craig.* This will be important when they are invited to co-create the solution during the ideation phase.

It should be noted that the design challenge does not refer to a solution because a design challenge should not specifying how the aimed impact will occur (IDEO, 2015a).

5.2 Developing the research plan

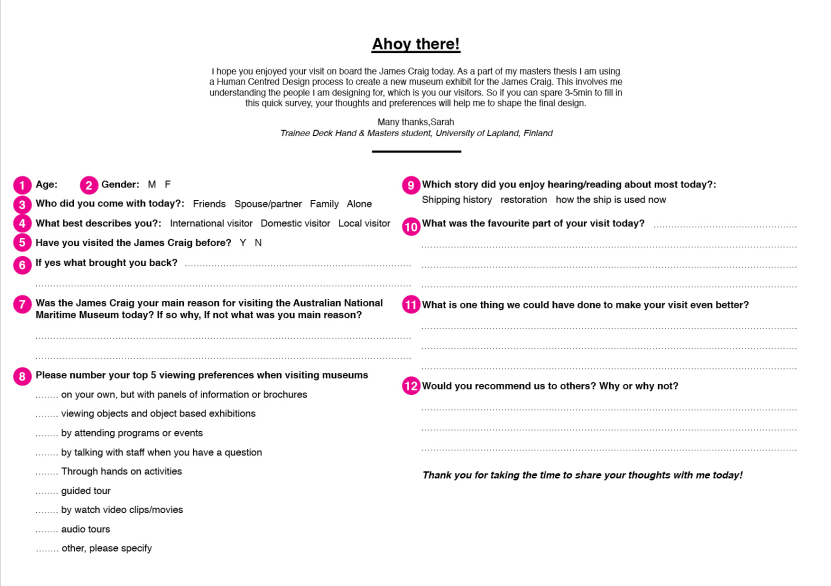
Developing the research plan involves reviewing existing assumptions, knowledge, constraints and barriers to establish what needs to be discovered (IDEO, 2015d) about the users and environment at the center of a design challenge (Brown & Wyatt, 2010).

Four days of field research were planned on board the *James Craig* to learn directly from visitors and guides, as the experience recipient and provider, about their motivations, limitations, wants and needs (IDEO, 2015b). In addition to understanding the current user experience for visitors and guides, the field research also needed to gain an understanding of the *James Craig's* operating environment by learning from experts in the field (IDEO, 2015d). Each of the research activities planned were tailored to each user group based on existing knowledge and any identified constraints and barriers (IDEO, 2015d).

5.2.1 Learning from and about visitors

Visitors are the target audience for the design challenge as they are an important source of revenue and are the recipient of the experience offered when the ship is open as a museum. As such understanding and leveraging their motivations, limitations, wants and needs will assist in creating opportunities to inspire them to care about the future preservation of the *James Craig*.

The pre-recruitment of visitors to attend an interview during the four days of field research was not practical due to limitations in demographic knowledge, funding and location. As a result the most appropriate research method to use with visitors was a quick written survey. The desired number of survey responses over the four days of field research was 40-50 in the hopes of identifying themes, trends and patterns.



Ahoy there!

I hope you enjoyed your visit on board the James Craig today. As a part of my masters thesis I am using a Human Centred Design process to create a new museum exhibit for the James Craig. This involves me understanding the people I am designing for, which is you our visitors. So if you can spare 3-5min to fill in this quick survey, your thoughts and preferences will help me to shape the final design.

Many thanks,Sarah
Trainee Deck Hand & Masters student, University of Lapland, Finland

1 **Age:** 2 **Gender:** M F

3 **Who did you come with today?:** Friends Spouse/partner Family Alone

4 **What best describes you?:** International visitor Domestic visitor Local visitor

5 **Have you visited the James Craig before?** Y N

6 **If yes what brought you back?** .....

.....

7 **Was the James Craig your main reason for visiting the Australian National Maritime Museum today? If so why, If not what was you main reason?**

.....

.....

.....

8 **Please number your top 5 viewing preferences when visiting museums**

..... on your own, but with panels of information or brochures
..... viewing objects and object based exhibitions
..... by attending programs or events
..... by talking with staff when you have a question
..... Through hands on activities
..... guided tour
..... by watch video clips/movies
..... audio tours
..... other, please specify

9 **Which story did you enjoy hearing/reading about most today?:**
Shipping history restoration how the ship is used now

10 **What was the favourite part of your visit today?** .....

.....

.....

11 **What is one thing we could have done to make your visit even better?**

.....

.....

.....

12 **Would you recommend us to others? Why or why not?**

.....

.....

.....

Thank you for taking the time to share your thoughts with me today!

Figure 8. Written survey used during the research
(question numbers are marked for easy reference in **table 1.**).

According to Brown and Wyatt (2010), conventional research methods like surveys are unable to yield sufficient impactful insights as they only ask people what they want. As a result it was planned to accompany the survey in **figure 8.** with impromptu questioning and observations. This is because people's actual behaviour can provide invaluable clues about a range of unmet needs (Brown & Wyatt, 2010). In order to gain additional insights into the visitor experience, observations were also planned onboard the other vessels at the Australian National Maritime Museum to see what

could be learnt by contrast. **Table 1.** details what needed to be discovered about visitors during the field research and what methods would be used to do so.

Table 1. What needs to be discovered about visitors and how it will be discovered

WHAT NEEDS TO BE DISCOVERED?	HOW IT WILL BE DISCOVERED?
What are the demographics of current visitors to the ship?	Written survey (Q1, Q2, Q3, Q4)
What are visitors currently enjoying most about their experience?	Written survey (Q6, Q10) Impromptu questioning • What was your favourite part of todays visit? Observations • What do visitors appear to be enjoying most?
What are the pain points in the current experience?	Written survey (Q11) No impromptu questioning as visitors may feel uncomfortable providing negative comments within earshot of the guides. Observations • Are there points in the experience visitors do not appear to be enjoying?
What are the museum viewing preferences of visitors to the ship?	Written survey (Q8)

What parts of the ship are visitors most interested in?	Written survey (Q10) Impromptu questioning • Did you have a favorite part of the ship today? Observations • Are there parts of the ship people spend lots of time looking at?
What parts of the *James Craig's* story are visitors most interested in?	Written survey (Q9) Observations • What parts of the story capture the most attention during guided tours? • Which parts do visitors zone out on?
Does the ship get many repeat visitors?	Written survey (Q5, Q6)
What motivates people to visit the James Craig?	Written survey (Q7)
Do visitors behave differently on the other vessels at the Australian National Maritime Museum? If so how?	Observations • How are people engaging with the other ships? • Is the atmosphere different? If so, what is the difference?

5.2.2 Learning from and about guides

Guides are important to the design challenge as they have a direct impact on visitor engagement with the ship as the providers of the museum experience. They also play a crucial role in ensuring the ship stays open through their continued engagement. As such understanding and leveraging their motivations, limitations, wants and needs is

important for helping to inspire visitors but also for ensuring guides stay engaged in order to keep the ship open.

In recognition of the fact that guides are volunteers and are comfortable with the way things are at present it was important to choose subtle and unobtrusive research methods. Observations of guides and visitors throughout the research days, both on and off the guided tours in conjunction with informal interviews or "quick chats" where questions are asked in response to what is occurring were deemed the most appropriate research methods to use. These methods work particularly well with guides, as they are accessible as they come on and off of guided tours during the day. **table 2.** details what needed to be discovered about guides during the field research and what methods would be used to do so.

Table 2. What needs to be discovered about guides and how it will be discovered

WHAT NEEDS TO BE DISCOVERED?	HOW IT WILL BE DISCOVERED?
What motivates guides to volunteer?	Informal Interview • How long have you been guiding for? • What do you like about guiding? Observations • How do the guides interact with each other? • How do the guides interact with visitors?
What tools and products are guides using at present? How and why?	Informal Interview • I see that you have "x", what do you use it for? • Is it helpful?

	Observations • Are guides using any particular tools? • When are they using them? • Are they using them for more than one purpose?
What is currently working and what isn't when the ship is operating as a museum? Are there areas guides feel need improving?	Informal Interview – The intention with this is to build rapport with the guides and then bring up observations in natural conversation to see what they say. Observations • Are the guides becoming frustrated with something? • Are things happening that make it difficult for them to perform certain tasks?
What experience are guides trying to give visitors at present?	Informal Interview • How do you like to do things as a guide? Why is that important to you? • Does everyone do it that way? Observations • What are the main parts of the experience? • Are there parts of the experience all guides are doing?

5.2.3 Learning from experts

Consulting with experts either through interviews or secondary research is important for developing in-depth knowledge about the current situation that cannot be gained by talking to users alone (IDEO, 2015d).

As the ship is a working vessel being used for such a variety of purposes an interview with the *James Craig's* shipwright will help to develop an understanding of the ship's operating environment. For example, there may be some safety considerations or heritage listing barriers that could effect the development of the final solution.

The following information needed to be discovered during the interview with the shipwright:

- What is currently working and what isn't when the ship is operating as a museum?
- What are the main heritage listing restrictions?
- What safety issues need to be taken into consideration?
    - e.g. Are there areas that must be kept clear?
- Considering the variety of activities the ship undertakes, what needs to be considered for the development of the final solution?
    - e.g. durability, portability etc
- Is it possible to add extra technology like TVs, iPads and audio systems to the ship?
- In regards to the current displays, does anything have to remain?

5.3 Conducting the research

After obtaining permission from the relevant Sydney Heritage Fleet stakeholders a total of four days research was conducted over two consecutive weekends onboard the *James Craig*. The decision to conduct the research over weekends was based on the assumption that there would be a more diverse mix of local and international visitors present.

The four days of research involved:

- observing visitors freely exploring the ship

- joining guided tours to observe visitor and guide interactions
- asking visitors to fill in surveys
- informal interviews with guides
- a formal interview with the shipwright
- observing visitors onboard the Australian National Maritime Museum's other vessels; and
- informal conversations with visitors.

During the research period the guides were very receptive of the informal interviews or "quick chats" with a total of five guides spoken to in-depth. The informal interviews facilitated the building of rapport with the guides by sitting or standing and having a "chat" with them as they came on and off of their guided tours throughout the day. This made them more comfortable in discussing what is involved in guiding, how they like to personally approach it, what issues arise for them and what experience they are trying to create for visitors.

The rapport built with the guides also aided in securing visitors to do the surveys with guides kindly recruiting them at the conclusion of their tours, or before they left the ship if they had done a self guided tour. The majority of visitors asked to participate in the survey were happy to do so unless they were pressed for time, with a total of 53 responses received over the four days. With the guides assisting in securing survey responses from the visitors it freed up more time to observe visitors and guides both on and off of the guided tours.

Observations were made by sitting at a series of different advantages points throughout the ship to see what visitors and guides were doing at different points in the end-to-end experience. Tours were also joined to observe visitor and guide interactions with all effort taken not to impinge on the experience for either user group.

When making observations onboard the Australian National Maritime Museum's vessels, time was taken to observe what was occurring with a particular focus on contrasting elements between the experience offered on each ship.

Figure 9. Guides preparing display boards before opening the ship, some of the current self guided panels and the books used by guides to tell visitors about the ship.

Learning about the *James Craig's* operating environment involved walking around the ship with the shipwright as he pointed out some of the operation and heritage listing features that needed to be taken into account as well as identifying under utilised parts of the ship.

Throughout the field research, notes were written in a different colour for each source of information so that findings could be traced back to their origin at a later date. Due care was taken to keep eye contact with interviewees with key points and occasional verbatim noted during natural breaks in conversation. This ensured that the guides, visitors and shipwright knew that their thoughts and opinions were really being listened to. During the observations notes were taken discreetly to avoid visitors and guides altering their behaviour.

The combination of research methods used worked well during the field research ensuring enough information about the current state and user experience was collected.

6. Ideation phase

The ideation phase involves several distinct stages that build upon one another to result in a working design solution. First, the research conducted during the inspiration phase is transformed into meaningful and actionable insights that draw from what was observed and heard. These insights act as a foundation for the future design by helping to create a clear picture of the user's wants and needs and their current experience (IDEO, 2015f). Opportunities for design are then identified from the insights and used to generate a large number of ideas, which are narrowed down into a fully-fledged concept. Components of the concept are then extensively tested through an iterative prototyping process (IDEO, 2015i).

6.1 Creating meaning

Synthesising the research findings to create meaning is one of the most challenging components of the human-centered design process. It involves identifying key patterns and themes that can be used as opportunities for design later on in the design process (IDEO, 2015f) as can be seen in **figure 10.**.

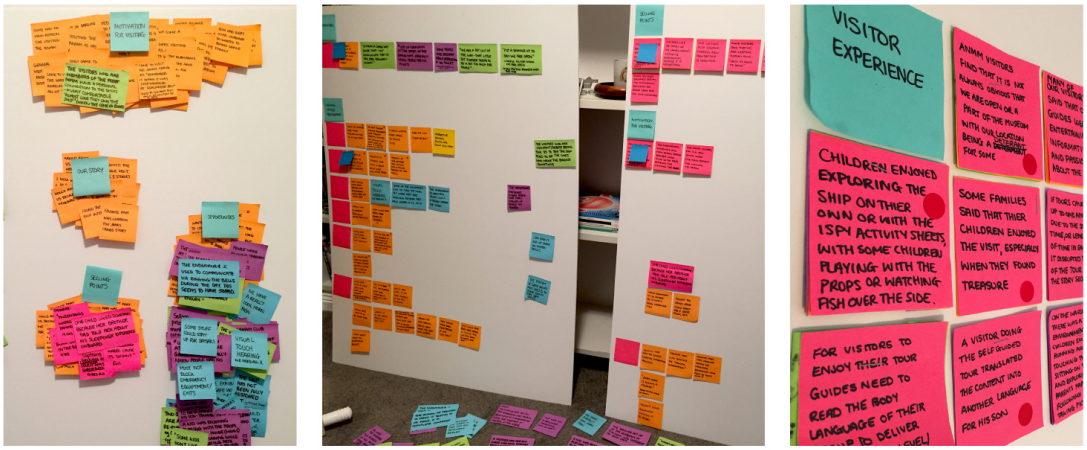


Figure 10. The three main stages of synthesis - clusters, themes and insight statements (IDEO, 2015f).

To begin the synthesis process each individual learning taken from the field research was written onto its own post-it note as they allow for flexibility when sorting and clustering the learnings (IDEO, 2015g). The learnings were a compilation of recollections and notes on what stood out in the conversations and observations during the field research (IDEO, 2015f). In order to track and maintain visibility as to the origin of each learning a colour was allocated to each research activity.

The demographic information collected in the surveys was also tallied to generate learnings on what kinds of groups visited the ship and what their viewing preferences were (see **figure 11.** for a visual representation of visitor demographics and viewing preferences for all visitors).

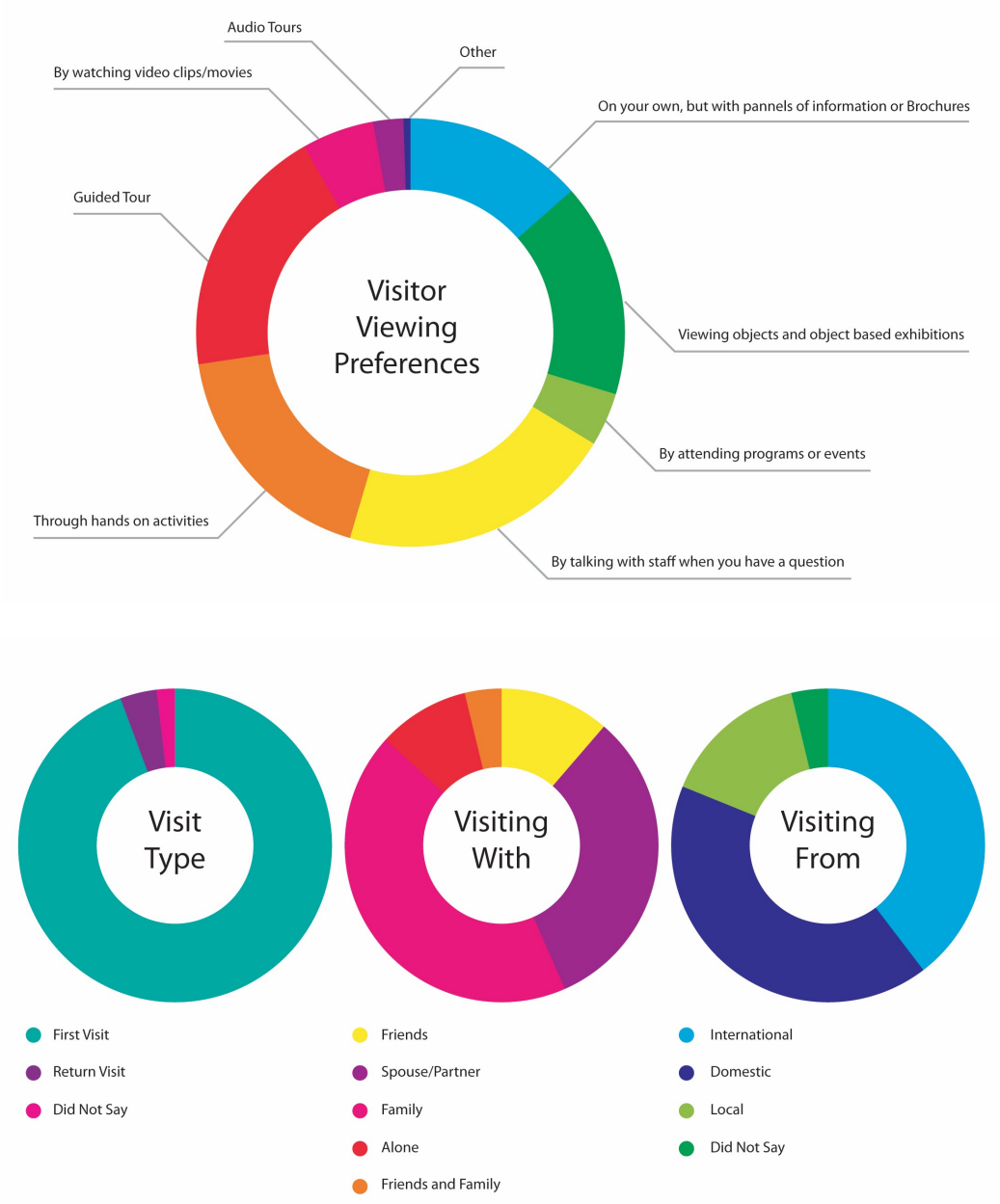


Figure 11. Visitor demographics and viewing preferences for all visitors as per survey.

Once all of the learnings were captured, the post-it notes were sorted into five main categories, or clusters as referred to by IDEO (2015f). The initial headings for the clusters that emerged were; motivation for visiting, our story, selling points, opportunities and guides/tours.

These clusters were then separated out and the learnings sorted and rearranged into more concise themes in order to identify emerging patterns and establish potential areas for design (IDEO, 2015g). The post-it notes from each theme were arranged into a horizontal line with duplicate learnings stacked on top of one another. Learnings and themes initially identified as potential opportunities for design were marked with a small blue post-it note.

Each theme was then transformed into a succinct full sentence to create an insight statement, which is a concise expression of what was learnt during the field research (IDEO, 2015f). The insight statements were written onto a new colour of post-it note and the learnings that supported it were stapled to the back. In some instances a theme was broken down further to generate multiple insight statements. Insights identified as opportunities for design were marked with a red dot.

To efficiently and effectively conduct the synthesis process detailed above, a design space was set up where the post-it notes could be hung up on the walls and on corflute boards. By utilising the design space there was sufficient room to move the information when trying to identify similar or complimentary learnings. The corflute boards provided flexibility and offered extra surface area when both sides were used. The design space was also used for the planning of the ideation workshop as illustrated in **figure 12.**.

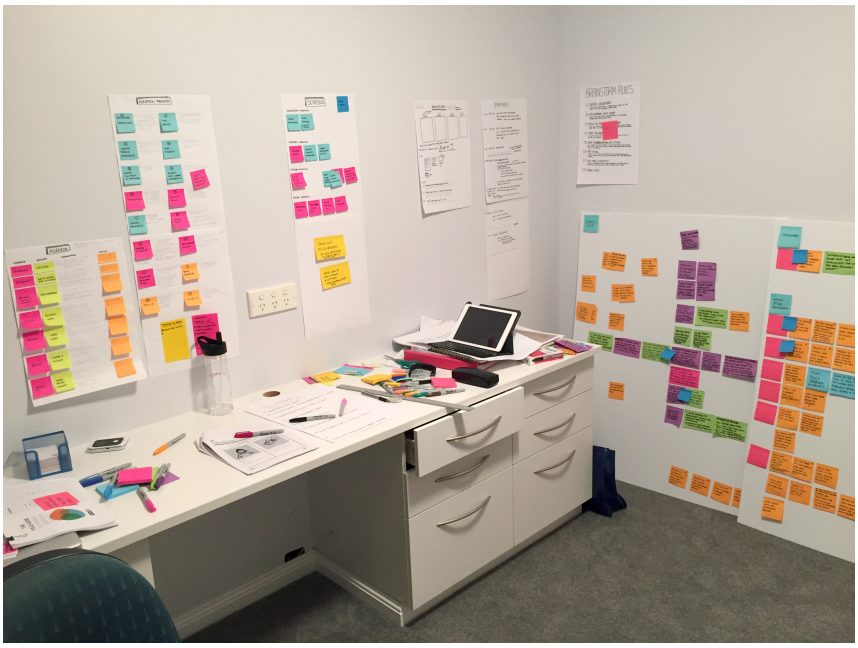


Figure 12. The design space used during the ideation phase of the project to synthesise learnings from the field research and plan the ideation workshop.

6.1.1 Insight statements

The insight statements generated during the synthesis process are listed in **tables 3-8.** under the final cluster headings; visitor demographics and characteristics, viewing style/preference, motivation for visiting, visitor experience, visitor interests and opportunities, considerations and constrains. It should be noted that not every insight captured is a new discovery, however they are still relevant to the design challenge as they may offer new perspectives when viewed in conjunction with others (IDEO, 2015f).

The legend in **figure 13.** indicates which research activities informed each insight statement, with the red dots in **tables 3-8.** identifying potential opportunities for design.

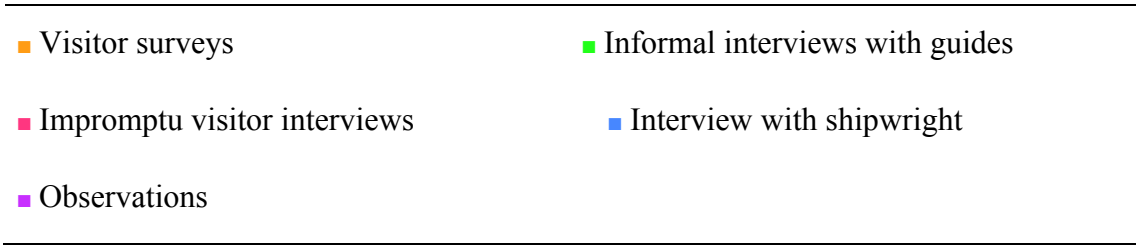


Figure 13. Colour legend for the origins of learnings and subsequent insight statements.

Table 3. Visitor Demographics and Characteristics

■■■■■	The vast majority of our visitors are first time or one off visitors	●
■■■■■	The majority of our visitors are international or domestic visitors	
■■■■■	We have a very small number of repeat visitors	●
■■■■■	Some children are very active and others don't like strangers	
■■■■■	The majority of our visitors came with a group or at least one other person	●
■■■■■	The majority of visitors in the 20-29 age group are international visitors	
■■■■■	The majority of visitors in the 20-29 age group visit with friends	●

- The majority our visitors are visiting with a spouse/partner or their family
- Not all of our visitors have the physical ability or fitness to do a 30 minute tour

Table 4. Viewing Style/Preference

- The 40-49 and 50+ demographic groups were the most interested in watching movies
- The most popular viewing preferences for all demographic groups were *through hands on activities* and by *talking with a member of staff when you have a question*
- All of the demographic groups had viewing objects and object based exhibits in their top 5 viewing preferences
- *Audio tours* and *by attending programs and events* were not in the top 5 viewing preferences for any demographic
- *On your own but with panels of information or brochures* was in the top 5 for all demographic groups except for the 40-49 age group
- *Guided tours* were in the top 5 viewing preferences for all demographic groups and rated 2nd overall
- The hands on activities viewing preference rated highly with the 20-29, 30-39 and 40-49 demographic groups
- Visitors and non visitors enjoyed walking around the ship and taking photographs

Table 5. Motivation for Visiting

	Some visitors were visiting the Australian National Maratime Museum (ANMM) due to a general maritime interest or love of ships
	Some visitors were only visiting the *James Craig* because the other ships or exhibits they came to see were closed
	People visit the ANMM with the goal of learning more about maritime history and how ships work
	Some of our visitors have no personal interest in maritime history, they are just accompanying a spouse/partner or friends
	For some visitors, the old tall ships were the main reason for visiting the ANMM
	Some visitors were visiting the ANMM because they were in the area, passing by or know of the ANMM and wanted to check it out
	Even if the *James Craig* was not the main reason for visiting the ANMM it was something people still wanted to see
	A family had come to visit the ANMM after their son had participated in a sleepover on the *James Craig* so that the whole family could enjoy the ship too
	Only on a few occasions was the *James Craig* the main reason for visiting the ANMM, with one visitor coming to see the shipwreck he used to play on at low tide restored to its former glory
	For some visitors, visiting the ANMM is an opportunity to spend time with family and friends
	Members of the ANMM are often more comfortable when visiting the ships and often visit to see what's new, with the *James Craig* being a favourite for some

- The submarine, warships and new action station exhibit were some of the main reasons for visiting the ANMM

Table 6. Visitor Experience

Children enjoyed exploring the ship on their own with the 'I Spy' activity sheets, with some children playing with the props or watching fish over the side	•
Majority of the time adults lead children on the *James Craig*	•
Some families said that their children enjoyed the visit, especially when they found treasure	•
Many of the visitors said that the guides were entertaining, informative and passionate about the ship	
Some visitors expressed that they loved everything about their visit	
Visitors enjoyed being able to explore the ship and its nooks and crannies on their own	•
People are often hesitant about approaching the ship if they don't have a ticket, but its these visitors who often make the biggest donations	•
Many visitors enjoyed the personalised tours around the ship with the insider information and stories told by the guides	
Visitors said that the guides are friendly, knowledgeable and helpful	
If tours caught up to one another due to the start time or lengths of time in each place it disrupted the flow of the tour and the story sequence	
On the warships there was a relaxed environment with children excitedly running around, touching things, sitting on things and exploring, their parents happily following along and taking pictures	•

- ANMM visitors find that it is not always obvious that the *James Craig* is open or a part of the museum with our location being a deterrent for some
- Visitors expressed that their visit was a great learning experience and that the visit would be a great school trip
- Visitors are not able to take the self guided map home with them
- Visitor groups who have definite time limits due to other engagements leave the ship angry and stressed if they are made to do a tour that goes for too long
- When the guides laid the guide books out, our visitors happily flicked through them by themselves
- A visitor doing the self guided tour translated the content into another language for his son
- For visitors to enjoy their tour, guides need to read the body language of their group to deliver the correct level/depth of detail for their audience
- Some visitors said that we are keeping history alive – “once its gone its gone”
- Some visitors became restless on tours once they passed the 30 minute mark with some tours exceeding 1 hour

Table 7. Visitor Interests

	Visitors like the story of the *James Craig's* history and restoration because it is interesting
	Some visitors expressed that they would have liked "more time to really visit the ship"
	Some visitors expressed that they would have liked to know the duration of the tour before starting
	Visitors really enjoyed seeing below decks, the crew' quarters and the captain's cabin
	Visitors also enjoyed hearing about how the ship is used now
	Guides were able to engage visitors and facilitate group participation by asking questions, actively listening to the visitors and responding, rather than talking at people
	Some visitors expressed an interest in having audio tours or virtual reality as a way of visiting the ship
	Some visitors indicated that they were interested in hearing about how the *James Craig* is used now even though the tours did not put emphasis on it
	Some visitors enjoyed seeing the difference between the *James Craig* and the *HMB Endeavour*
	Visitors only occasionally ask to go down into the hull or the engine room
	Families said that they would have liked more hands on activities – "make the kids scrub the deck"
	Visitors enjoyed the upper deck with many taking photos of the rigging or of each other at the wheel

- Some visitors found it interesting to see the ship in its original form and hear about how it was made and used
- Visitors said that they found the ship and its craftsmanship beautiful
- Many visitors were interested in the maintenance activities occurring on the ship, but there was often no opportunity to ask about them
- Some people wanted to be able to do further research after their visit
- Guides expressed that more work needs to be done to provide a "warmer welcome"
- Visitors were fascinated by the history of the living conditions and lifestyle of the crew
- The speed of the ship is a point of interest for many visitors as they frequently ask how fast it goes
- Visitors enjoyed the novelty of hearing where the language expressions come from
- Some visitors thought taking the ship sailing would have made their visit better

Table 8. Opportunities, Considerations and Constrains

- Some of the guides give children tasks to do during the tour, which need to be matched to the child's capability such as apprentice sailor, count the rivets, find treasure or the second bell
- Simple audio and video technology such as iPods and DVD stacks could easily be installed to add sounds or show many items of footage

- The ‘Tween Deck becomes uncomfortably quiet when the video is turned off by maintenance staff because its annoying in its familiarity, or when it ends because it hasn’t been put on repeat
- There are parts of the ship such as the Navigation room and objects such as the sewing machine and new horn or decommissioned harnesses and yards that could be utilised
- Product knowledge is important for guiding but volunteers are hard to manage so there is a lack of training and consistency
- *James Craig* volunteers either believe things added to the ship should blend in or be a complete contrast
- Guides said that the ANMM and the heritage fleet need to work together better to increase promotion of the *James Craig*
- Guides need to be able to manage people in spaces so that groups do not overlap and seamlessly navigate around areas sectioned or closed off for maintenance
- There is a social comradeship to guiding, with guides treating each other to snacks or coffee from cafes or enjoying leftover cake from onboard functions
- The majority of visitors said that they would recommend visiting the *James Craig* to others
- The books are an important tool for helping the guides to illustrate the story they are telling even though the guides don’t all tell the story in the same order
- The sectioning off of the ship for maintenance sometimes works at cross purposes to the easy navigation of the ship for tours and self guided exploration
- The two documentaries we currently play have amazing footage but are too long for visitors to watch the whole way through

- Visitors rarely purchased merchandise, the full range of which was not visible and on the occasions purchases are made, the guides struggle to give change as there is an inadequate float onboard
- There are quite a large number of flyers which were not set up the same way and were rarely handed out, which mention our events and products, but rarely fit into the natural conversation
- We have a blank canvas to work with, but we must not block emergency equipment or exits and the solution must be durable with a max life expectancy of 5 years
- The solution if safe would not need to be removed for day sails, for example items could be hooked over the wood railings in the ‘Tween Deck
- There are parts of the ship which have not been fully restored yet like the bilge pump
- At present a guided tour is the default option given to visitors by some guides, with self guided tours mainly offered at peak times or in some instances not at all
- The general atmosphere on board was improved when there were many groups of people, tours were under 30 minutes and visitors were offered a choice to tour or self guide
- The ship has working parts like the capstan and bilge pump that could be great for scheduled demonstrations
- The weather and hunger can effect how much time visitors want to spend at the ship and can effect the enjoyment of their visit

6.2 Turning opportunities for design into generative questions

According to IDEO (2015g), the most powerful component of the human-centered design process is turning exisiting challenges into opportunities for design by creating generative "*how might we"* questions that allow for the conception of innovative new ideas and solutions (IDEO, 2015f).

6.2.1 How might we questions

How might we questions are the starting point of the brainstorming process and are written in response to a small selection of insight statements (IDEO, 2015f) which "convey a new perspective or sense of possibility" (IDEO, 2015g, p.10). The format of these questions allows for the generation of responses to the initial insights by acting as an invitation for input, suggestions and exploration. It is important that *how might we* questions are not too broad and do not imply a solution in order to avoid hindering creativity (IDEO, 2015f). The insight statements not used to generate the *how might we* questions feed into and influence other parts of the ideation phase by helping to keep the needs and wants of users in mind during concept development and prototyping (IDEO, 2015f).

Table 9. lists the five *how might we* questions developed, the insights used to generate them and how they relate to the design challenge. Collectively, these questions narrow the scope of inquiry without hinting at a final solution (IDEO, 2015f).

Table 9. *How might we* questions, related insights and relevance to design challenge

Question	Insights	Relevance to design challenge
How might we tell our story if there are no guides?	At present a guided tour is the default option given to visitors by some guides, with self guided tours mainly offered at peak times or in some instances not at all.	From the survey results it was clear that the *James Craig's* visitors had a diverse range of museum viewing preferences. Providing visitors with a way to engage with the ship that meets their personal preference, may help to increase their engagement with the preservation of the ship. This *how might we* question is most likely to disrupt workshop participants as it asks them to think outside of the current experience.
How might we facilitate adult and child lead self learning and exploration of the James Craig?	Some visitors expressed that they would have liked "more time to really visit the ship". Majority of the time adults lead children on the James Craig.	The surveys and observations on board the *James Craig* identified that adults and children enjoyed exploring the ship on their own, unlike on the ANMM ships where children were lead through this exploration. Allowing for self exploration lead by both children and adults is hoped to help them forge personal connections with the ship.

How might we provide opportunities for visitors to socialise as a group?	The majority of our visitors came with a group or at least one other person. For some visitors, visiting the ANMM is an opportunity to spend time with family and friends.	Since the majority of visitors come in groups this question aims to generate ideas that allow for groups to socialise during their visit in the hopes that positive social interactions on board may result in enjoyment based donations or at the very least positive word of mouth promotion to others.
How might we encourage potential visitors with or without a ticket to visit the ship?	ANMM visitors find that it is not always obvious we are open or a part of the museum with our location being a deterrent for some. People are often hesitant about approaching the ship if they don't have a ticket, but its these visitors who often make the biggest donations.	This question aims to address the pain points which deter potential visitors from visiting the ship as they need to be able to attract visitors in order to inspire them to care about the future preservation of the ship and/or make donations.

How might we periodically provide something new to attract repeat visitors?	Members of the ANMM are often more comfortable when visiting the ships and often visit to see what's new, with the James Craig being a favourite for some. We have a very small number of repeat visitors.	The more often visitors engage with the ship, the more likely they are to care about its ongoing preservation. As such this question aims to generate ideas for enticing repeat visitors to the ship in order to increase their engagement.

6.3 Generating ideas

Generating ideas involves using the *how might we* questions developed to brainstorm as many ideas as possible and then turn the best ones into concepts for prototyping (IDEO, 2015h). It is during this stage of the ideation phase that collaboration becomes an important part of the process to encourage divergent thinking and creativity (Brown & Wyatt, 2010).

To ensure collaboration and to enable volunteers to participate in the ideating and conceptualising stages of the process, an ideation workshop was planned onboard the *James Craig*. An invite was sent out to guides, crew and other stakeholders inviting them to participate in the process with the shipwright and a handful of crew and guides volunteering to attend the workshop.

6.3.1 Planning the ideation workshop

The ideation workshop was planned around the intent of generating innovative concepts for prototyping by providing participants with the tools needed to creatively express themselves (Sanders & Strappers, 2008). In order to provide a safe and familiar environment for participants it was decided to hold the ideation workshop onboard the *James Craig* at the 'Tween Deck mess tables. This space would help to create an inclusive environment because it provides ample room to move around, big enough tables to sit all participants and is out of the way of visitors and guides. To

keep energy levels high during the workshop an assortment of biscuits, lollies, chocolates, tea and coffee were purchased to be provided on the day.

In order to harness the collective creativity of the group a selection of IDEO's methods where chosen for use during the workshop. These methods were placed into sequential order and estimated timeframes were allocated to each activity to create an agenda for the workshop as can be seen in **table 10.**

Table 10. Agenda for the Ideation Workshop.

DURATION	ACTIVITY NAME
15-20 min	Welcome Message*
30 min	Our Visitors*
60 min	Brainstorm (IDEO, 2015i)
30min	Break
60 min	Select promising ideas (IDEO, 2015i)
20min	Gut check (IDEO, 2015i)
1 hr	Storyboarding (IDEO, 2015i)

*fit for purpose activity not based on IDEO's methods

The generative tools used in each activity were modified to create a matching visual suite of assets for the workshop (see **figure 14.**). The hand drawn nature of the assets aimed to communicate to workshop participants that the process is meant to be fun, fast paced and open to change.

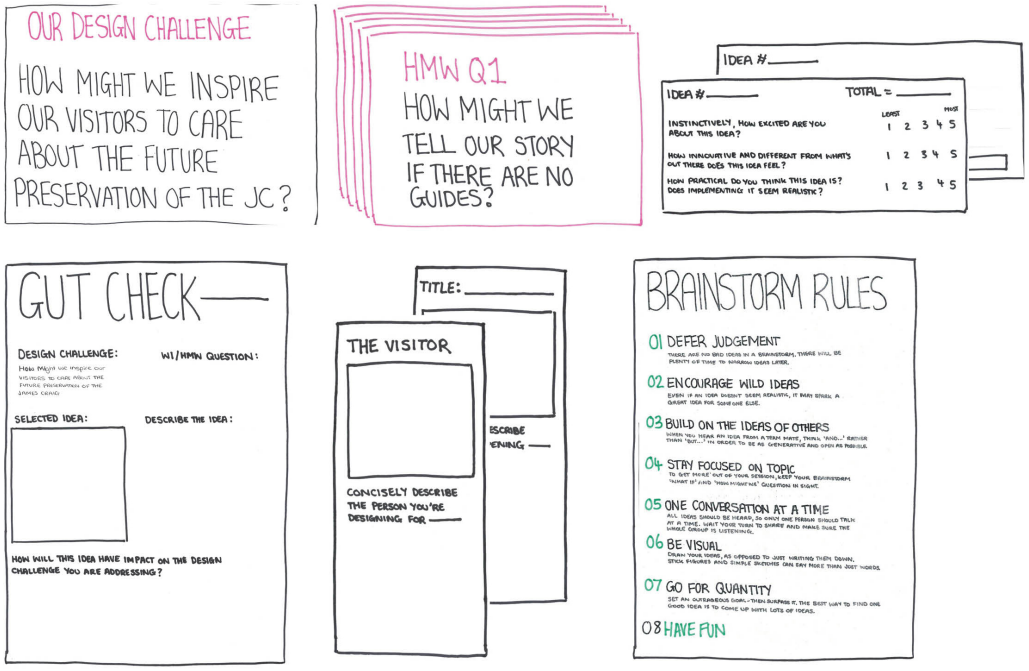


Figure 14. Recreation of IDEO (2015i) templates to create a matching suite.A series of activities sheets detailing the duration, process, tools and set up required for each activity were also put together to assist with facilitation on the day of the workshop.

Figure 15. One of the activity sheets developed to assist with workshop facilitation.

The following section outlines the intended outcomes of each activity, how they worked in practice and the outputs generated during the workshop.

6.3.2 The ideation workshop

6.3.2.1 Welcome message

The welcome message aimed to officially kick off the ideation workshop by setting the tone for the day and by bringing participants up to speed on IDEO's human-centered design process by discussing:

- what had been conducted so far
- where the workshop fits into the process
- what would be achieved during the workshop
- what their personal contribution would be as workshop participants; and
- next steps to occur after the workshop.

On the day of the workshop, the welcome message successfully explained to participants the context behind the project and how they would personally contribute to the final solution through the design process. It also helped to set the tone by generating excitement and establishing an open and collaborative environment.

6.3.2.2 Our visitors

The our visitors activity was developed to facilitate participants gaining an understanding of the current user experience so that they could fully participate in the brainstorming and concept development sessions.

Originally, the intention was to stick the clusters of insights up on a wall and invite all of the participants to pick three insights to share back with the group that they found to be new, surprising or of interest to them. On the day of the workshop this was not feasible as there was inadequate wall space to post up the insights. As a result the insights were laid out on a flat surface and the group was split into two, with half viewing the insights and half having a morning tea break before swapping.

The majority of participants took the time to read every insight, with some pealing back the layers of the more contentious insights to examine the learnings that had

formed them. The most frequently raised and discussed insights during the share back were:

- viewing preferences, for example the popularity of hands on exhibits especially in the absence of any on board
- what visitors were interested in, for example maintenance; and
- visitor demographics.

During the share back discussion, participants also raised some of the pain points in the current experience that they felt they could fix immediately as holders of certain roles within the fleet. For example, the shipwright had not realised that maintenance activities caused such a disruption for the guided tours and committed to working with guides to avoid such occurrences going forward.

Confirmation was received at the conclusion of the share back and discussion that participants had a good understanding of the current user experience and were excited to move forward into the brainstorm.

6.3.2.3 Brainstorm

The brainstorming session aimed to generate as many ideas as possible to answer the *how might we* questions by leveraging the collective creativity of the group (IDEO, 2015i). Although brainstorming generally appears to be an unstructured activity, it actually involves a lot of discipline from the group to engage with each other by listening carefully, staying on topic and building on the ideas being generated (IDEO, 2015i).

At the start of the brainstorming session the group was introduced to the design challenge and invited to briefly discuss what it meant to them. It was immediately clear that the design challenge resonated with the participants and that they had a shared understanding, so post-it notes, sharpies (marker pens), lollies and the brainstorming rules were distributed. In order to track which ideas had been generated by each *how might we* question, a particular colour of post-it note was allocated to each question. The workshop participants then took turns reading aloud the brainstorming rules one at a time (see **figure 16**).

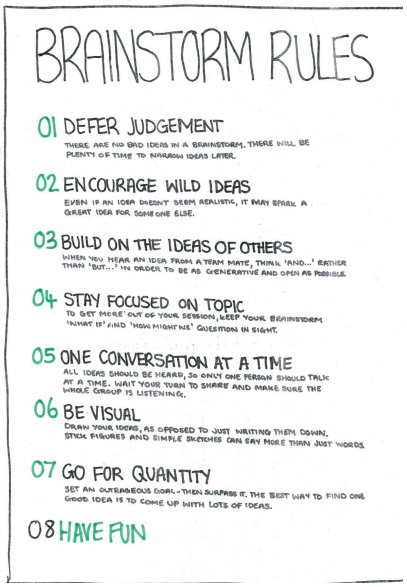


Figure 16. IDEO's brainstorming rules read aloud by participants (IDEO, 2015h, p.6)

To maintain focus and energy throughout the brainstorming session 10 minutes was allocated to each question so that the entire session would not exceed an hour (IDEO, 2015h). To ensure that participants were able to transition into the correct mindset for the session, the first *how might we* question was used as a test run. The aim of having the test run was to see how the group conducted the brainstorm and to check if the allotted time of 10 minutes per question was adequate before moving into the brainstorm full swing.

The first question was hung on the wall where everyone could see it, read aloud and then the clock was started. The following behaviours were observed during the test run:

- participants were writing more than one idea per post-it note
- very few participants were drawing their ideas, only writing them
- some participants were not reading their ideas aloud to the group; and
- some participants would detail their ideas out loud causing discussions that disrupted the brainstorm.

At the end of the 10 minuets it was explained to participants that the first question was a test run. The group then discussed what had worked well and what needed improvement based on the first attempt. The second question was then posted on the wall and the process was repeated. After the second session the participants requested a break for lunch before continuing with the remaining questions. In sessions 2-5 the following behaviour was observed:

- only a few participants persisted in writing multiple ideas on one post-it note
- most participants read their ideas aloud to the group, with only occasional discussions caused by participants detailing their ideas
- most participants persisted in writing their ideas rather than drawing them
- in some instances ideas were met with judgement if they seemed too wild or impractical for safety or financial reasons – other members of the group were quick to stamp out this behaviour after it was reiterated that impractical ideas would be culled later
- participants built upon the ideas of others, with ideas about hands on activities causing the most excitement
- participants kept to one conversation at a time for the most part
- sometimes the group strayed off topic when expanding on ideas they were excited by - participants were gently alerted to this on several occasions by the facilitator or one of the other participants which helped everyone to get back on track
- when the flow of ideas slowed down, the facilitator was able to reinvigorate the brainstorm by contributing ideas or providing encouragement; and
- in two instances the flow of ideas stopped before the allocated time had expired so the group was moved onto the next question to keep the momentum going.

A considerably large number of creative ideas had been generated by the end of the brainstorming session. These ideas have been synthesised, grouped into themes and recorded in **tables 11-16.** below, with numbers indicating which *how might w*e questions sparked each one (see **figure 17.** for the legend).

From a facilitators viewpoint, it was difficult to contribute ideas to the brainstorm as the majority of time and effort was put into ensuring participation and encouraging the generation of as many ideas as possible. A facilitator could combat this by having a collection of pre-generated ideas to contribute during the brainstorm. This would allow for their professional knowledge to be utilised during this part of the design process.

❶ How might we tell our story if there are no guides?

❷ How might we facilitate adult and child lead self learning and exploration of the *James Craig*?

❸ How might we provide opportunities for visitors to socialise as a group?

❹ How might we encourage potential visitors with or without a ticket to visit us?

❺ How might we periodically provide something new to attract repeat visitors?

Figure 17. Legend to denote the *how might we* question that generated each idea.

Table 11. Programs and Events

❶❷❸❹❺	Cinema on the sails
❶❷❸❹❺	Exhibitions onboard
❶❷❸❹❺	Night/evening tours/talks
❶❷❸❹❺	Theatre performance eg. Shakespearean comedy
❶❷❸❹❺	Public sleepovers eg. parent and child
❶❷❸❹❺	Mothers and fathers day events onboard
❶❷❸❹❺	Course on outboard motor repair and maintenance
❶❷❸❹❺	Special event occasions

Table 12. Hands on Activities

12345	Add to baggy winkle (a device used to protect sails from chaffing) for a gold coin donation
12345	Hats for kids to wear in photos at the wheel
12345	Hammock tying (family activity)
12345	Large model of ship with sails to set and furl and yards to raise
12345	Family problem solving activity eg. get the ship off the dock
12345	Organise and stack cargo
12345	What is it audio quiz eg anchor being raised, lifts on mast etc
12345	Belaying the lines activity station
12345	What's in the box activity
12345	*James Craig* water play station with model ship, buckets and toys
12345	Scramble net for kids to climb on
12345	Find the stowaway activity (find the rat)
12345	Knot tying station, could also be set up as a race
12345	Swab the decks activity with instructions
12345	Name the cargo activity
12345	Face board
12345	How did they fix it quiz
12345	Dress ups

❶❷③④⑤	Compass game eg. use compass headings to find the treasure
①②❸④⑤	Lego building of the ship
①②❸④⑤	Tug a war with and without a handy billy (to show how it makes lifting loads easy)
❶❷③④⑤	Role paying with items of period clothing
①❷③④⑤	Exam on visit content
①②❸④⑤	Shanty corner
❶②③④⑤	Man the tools maintenance activity - have a go at maintenance eg chipping hammers
①②❸④⑤	Puzzle model of ship to put together
①②❸④⑤	Keel haul practice
①②③④❺	Travel through the ages interactive map with voyages and cargo
①❷③④⑤	Crew cards with info about actual sailors on the ship

Table 13. Scheduled Activities and Demonstrations

❶❷③④⑤	Fire party patrol (dress up)
①②❸④⑤	Rope bracelet making session
①❷③④❺	Shanty and sail hoisting session
①②❸④❺	Daytime shanty singing session
①②❸④⑤	Eat ships biscuits eg. could be sold before tour
①②❸④⑤	Make dandyfunk

1 2 3 4 **5**	Marine engines demonstration
1 2 3 4 **5**	Climbing the rigging for public
1 2 3 4 **5**	Sail making demonstration
1 **2** 3 4 5	Firing a cannon
1 2 **3** 4 5	Lime juice tasting
1 2 3 4 5	Bilge tours
1 2 3 4 **5**	Jiboom climb once a month for ages 12 and above
1 2 3 4 **5**	Bring one of the small boats onboard and do maintenance on it
1 2 3 4 **5**	Maintenance demonstrations eg. fixing the yards, rust chipping, carpentry
1 2 3 4 **5**	Sail handling demonstration

Table 14. Advertising

1 2 3 **4** 5	Billboard person
1 2 3 **4** 5	Notices with local hotels, nearby cafes and on trains/light rail
1 2 3 **4** 5	Sign at ferry wharf or the star casion
1 2 3 **4** 5	Council street sign with image of *James Craig*
1 2 3 **4** 5	Give children who visit a *James Craig* branded balloon
1 2 3 **4** 5	Call to adventure sign
1 2 3 4 5	Sign saying we can't afford guides

❶❷❸❹❺	T-shirt making template of the ship for kids to take home or T-shirt making with fabric crayons onboard (kids then become advertising medium when wearing shirts)
❶❷❸❹❺	People without a ticket have to walk the plank
❶❷❸❹❺	Canvas sail sign
❶❷❸❹❺	Pictogram sign of the ship
❶❷❸❹❺	Clearer signage on the gangplank to welcome people aboard
❶❷❸❹❺	Gorilla sticker campaign with #jamescraig stuck around town
❶❷❸❹❺	Sailor in costume walking around with #jamescraig on their back
❶❷❸❹❺	Crew wear shirts with #jamescraig on their back
❶❷❸❹❺	Directional signage around darling harbour to the *James Craig*

Table 15. Self Guided Exploration

❶❷❸❹❺	Numbered stations at interesting parts of the ship
❶❷❸❹❺	Audio listening ports around the ship eg. headphones with *James Craig* stories
❶❷❸❹❺	Treasure hunt
❶❷❸❹❺	Foot prints, arrows or coloured lines to guide visitors around the ship
❶❷❸❹❺	Audio tours in different languages on a hand held device
❶❷❸❹❺	Phone app tour
❶❷❸❹❺	QR code tour

❶❷❸❹❺	Signs with stories from primary sources
❶❷❸❹❺	I Spy – clear set of questions for parents to discover with their kids
❶❷❸❹❺	Kids make a video around the ship
❶❷❸❹❺	Display boards with stories, facts and fiction, ship plans, maintenance tips and tricks and photos (can rotate periodically)
❶❷❸❹❺	Panels of information telling the story of the ship
❶❷❸❹❺	Section the ship off for easy navigation
❶❷❸❹❺	Collect the stamps tour (stations around ship with stamps to stamp card with)
❶❷❸❹❺	Rat character as a guide for the self guided tour – follow the rat
❶❷❸❹❺	Follow a trail to certain points on the ship
❶❷❸❹❺	Display with activities to do
❶❷❸❹❺	Take home postcard map of ship

Table 16. Additional Features and Improvements

❶❷❸❹❺	Suggestion book at the exit
❶❷❸❹❺	A3 bullet points
❶❷❸❹❺	Question sheet at entry
❶❷❸❹❺	More photos, pictures and videos on display
❶❷❸❹❺	State duration on videos
❶❷❸❹❺	Have smells around the ship eg. Swedish oil

❶❷❸❹❺ Open and closed signs that are in different languages or pictorial

❶❷❸❹❺ Café including a bar onboard

❶❷❸❹❺ More manikins on display eg. in period costume

❶❷❸❹❺ Ship noises playing in background e.g. electronically activated

❶❷❸❹❺ More period items around the ship

❶❷❸❹❺ Rotate activities, videos and audio periodically

❶❷❸❹❺ Replace entrance price with gold coin donation

❶❷❸❹❺ Make activities for kids clear by using big pictures

❶❷❸❹❺ Construct a more appropriate gangway

❶❷❸❹❺ Increase presence on social media

❶❷❸❹❺ Panel of information at entrance with what maintenance is happening

❶❷❸❹❺ Have a large "open" sign hanging over the side of the ship

❶❷❸❹❺ Have cargo/boxes etc on display

6.3.2.4 Selecting promising ideas

The large quantity of ideas generated during a brainstorm needs to be narrowed down by identifying the most promising ideas to move forward with (IDEO, 2015h). This is the part of the process where impractical ideas are discarded and the best ones naturally rise to the top (IDEO.org, 2015) to serve as a foundation for concepts to be tested during the final part of the ideation phase (IDEO, 2015f).

Working as a group, participants were asked to quickly group the ideas (IDEO, 2015h) to minimise duplication and put similar and alternative solutions in close proximity. This was conducted around two tables to provide sufficient standing space and presented an exciting challenge for participants. It took a considerable amount of time to complete the exercise even with effective collaboration, however it ensured

that participants were able to get across the content before voting on the first cut of ideas (IDEO, 2015h).

Participants were then asked to vote in silence on three ideas by sticking a red dot onto an idea for each of the criteria of; most innovative, most practical to implement and that they were personally most excited by as can be seen in **figure 18.**. By voting in silence IDEO (2015i) suggests that the likelihood of participants being swayed by the opinions of others is minimised. Each participant was given an additional vote as the group felt that there were a lot of great ideas to choose from. The first cut of ideas established during the vote are listed in **table 17.**.

Figure 18. Workshop participants voting on the ideas they would like to take forward.

Table 17. Ideas voted for and the number of votes (red dots) each idea received

What is it audio quiz eg anchor being raised, lifts on mast etc ●●
Ship noises playing in background e.g. electronically activated ●●●●
Jiboom climb once a month for ages 12 and above ●●●
Maintenance demonstrations eg. fixing the yards, rust chipping, carpentry ●●●●●
Puzzle model of ship to put together ●

Sail handling demonstration ●

Compass Game eg. use compass headings to find the treasure ●●

Panel of information at the entrance with what maintenance is happening ●●

Have a large “open” sign hanging over the side of the ship ●

Phone app tour ●

Sailor in costume walking around with a hash tag on their back ●

Crew wear shirts with #jamescraig on their back ●

Construct a more appropriate gangway ●

Keel haul practice ●

Travel through the ages interactive map with voyages and cargo ●●

Have cargo/boxes etc on display ●●●

Display boards with stories, facts and fiction, ship plans, maintenance tips and tricks and photos (can rotate) ●●●

Crew cards with information about actual sailors on the ship ●

Role paying with items of period clothing ●

Special event occasions ●

Directional signage around darling harbour to the James Craig ●

Hammock tying (family activity) ●●●

Take home postcard map of ship ●●

Add to baggy winkle for a gold coin donation ●

After the first cut of ideas had been established the next stage was to re-evaluate the selected ideas and decided as a group which ones would be developed further. To do this the selected ideas were laid out on an empty table with the goal of narrowing them down to five or less (IDEO, 2015i). It was explained to the group that the ideas chosen would be tested in the coming week where possible, and that any ideas that didn't make the cut could still be explored at a later date. There were times during the discussion when the group heavily debated certain ideas. An example of this occurred in relation to the take home postcard map of the ship. At present a map is handed to visitors to use and then returned at the end of their visit, which costs next to nothing for the fleet. By providing all visitors to the ship with their own take home map there would be a dramatic cost increase and on this basis the group eventually ruled out the idea.

At the end of the discussion the group had settled on the selection of ideas listed in **table 18.**, to work into a concept on the basis of what was practical, implementable and testable (IDEO, 2015i).

Table 18. Ideas selected to move forward with.

Ship noises playing in background e.g. electronically activated
Panel of information at the entrance with what maintenance is happening
Maintenance demonstrations eg. fixing the yards, rust chipping, carpentry
Have a large "open" sign hanging over the side of the ship
Display boards with stories, facts and fiction, ship plans, maintenance tips and tricks and photos (can rotate)
Add to baggy winkle for a gold coin donation

6.3.2.5 Gut check

The g*ut check* provides an opportunity to test that the selected ideas align to the original intent of the design challenge before taking them forward into the concept development and prototyping stages of the process (IDEO, 2015i).

In this particular instance, it was also identified that the *gut check* would provide an opportunity to ascertain if the workshop participants had a shared understanding of the ideas before moving forward.

Working individually, participants were asked to fill out the *gut check* activity sheet (see **figure 19.**) by describing an idea and then articulating how the idea would help to address the intent of the design challenge (IDEO, 2015i). This allowed participants to express how they had interpreted the idea, what they perceived the benefits to be or to provide opinions on how the idea should be modified to increase the benefits (IDEO,2015i).

Each participant was then invited to share their response with the group so that any points of differentiation could be discussed and agreed upon. During the share back, one of the participants contributed the new idea seen in **figure 19.** because he felt that none of the ideas selected by the group overtly encouraged donations from visitors. The group was immediately receptive of the idea and the decision was made to take it forward in the process.

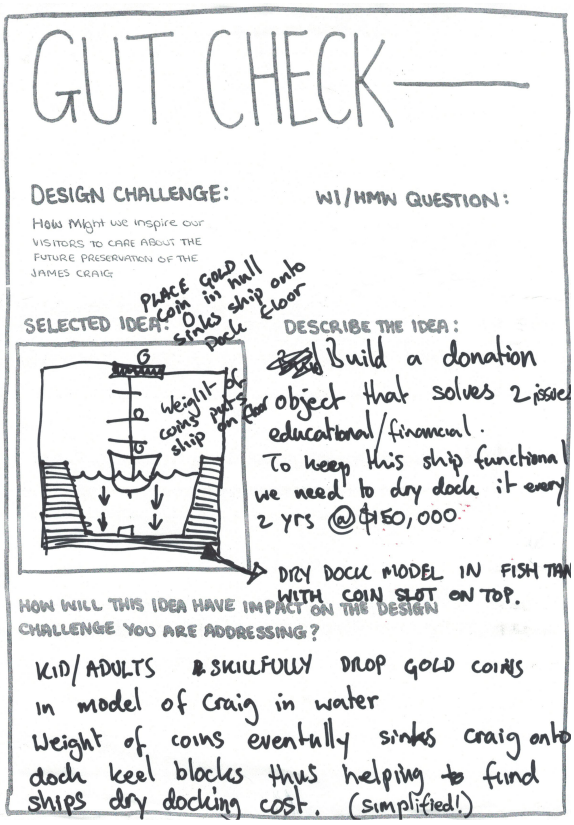


Figure 19. Additional idea contributed during the *gut check* (IDEO, 2015i) and adopted by the group.

By the conclusion of the activity all of the workshop participants had a shared understanding of the ideas and were confident they would help to answer the design challenge.

6.3.2.6 Storyboarding (concept development)

Storyboarding allows for multiple ideas to be transformed into a fully-fledged concept by visualising the end-to-end user experience in bite sized pieces (IDEO, 2015i). This assists in the identification of components to be tested during the prototyping stage of the process and signifies the project moving from problem to solution (IDEO, 2015h).

On the day of the workshop it quickly became evident that the participants were struggling to grasp the concept of storyboarding. After 10 minuets of attempting to work on the activity the decision was made to abort it and instead hold a quick 15 minute discussion to end the workshop. The discussion focused on what the future end-to-end user experience would be from the time someone purchased a ticket from the *Australian National Maritime Museum* up until they left the *James Craig*. In order to capture the full experience the focus was placed on a mother and child's experience, steering clear of the guided tour. It was during this discussion that the

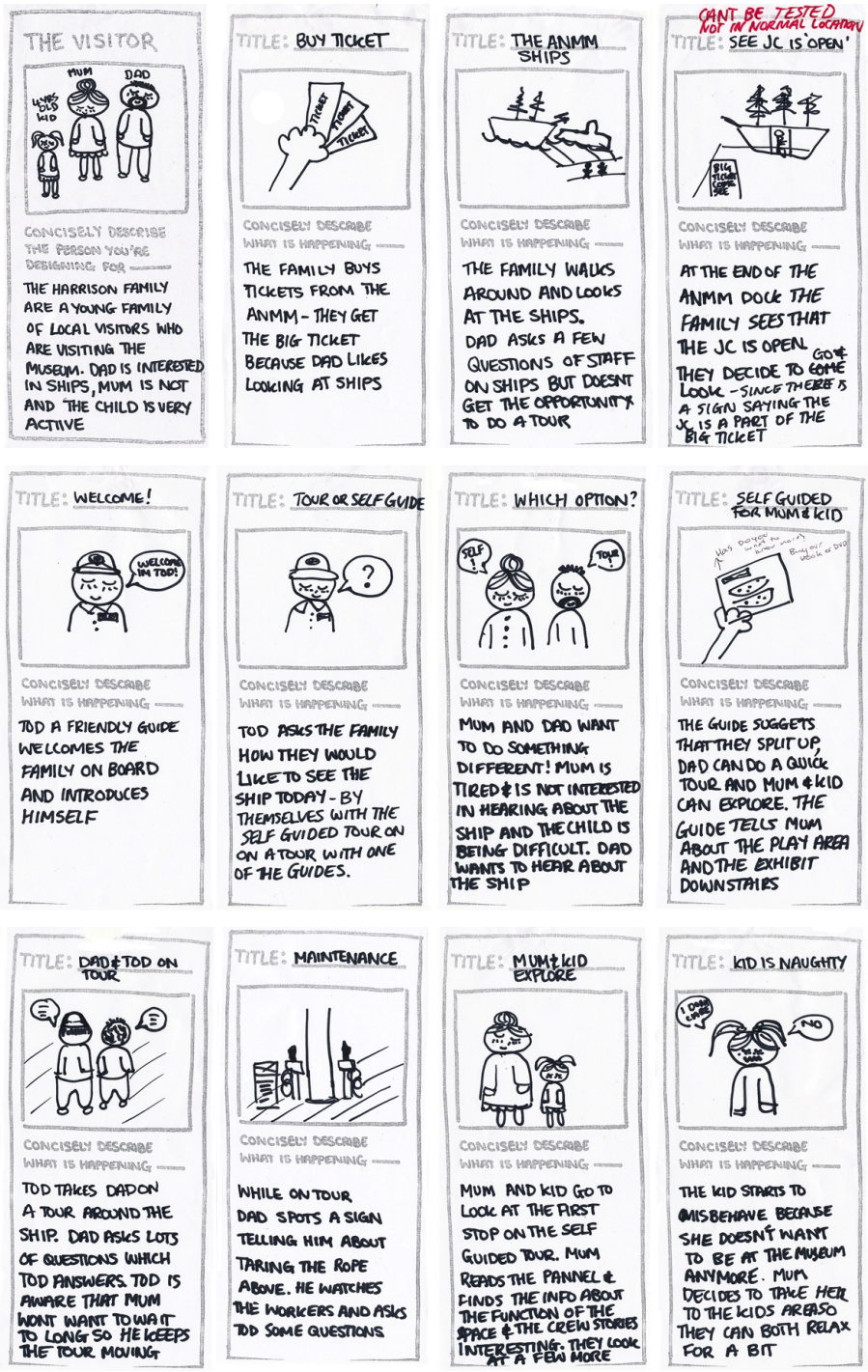
additional idea of having a break-out-space for kids and parents was generated and added.

6.3.2.7 Final storyboard

The storyboard (**figure 20.**) created post workshop comprises of a beginning, middle and end and ties together multiple components and ideas (IDEO, 2015i) by telling the story of a family's visit to the ship. It was constructed by meshing together notes from the discussion with workshop participants, existing elements in the experience such as guided tours and learnings from the research. The addition of research learnings allows for some of the pain points and positive features in the current user experience to be either addressed or accentuate. For example, the wife in the story represents visitors who have no personal interest in maritime history and are just accompanying their spouse. By using her character it was possible to construct a mini end-to-end user experience that may potentially align to her needs, wants, motivations and limitations.

As the storyboard is not set in stone but open to change throughout the process, components were quickly sketched and accompanied with rough hand written notes on individual panels so that they could be rearranged as required (IDEO, 2015i).

THE STORYBOARD



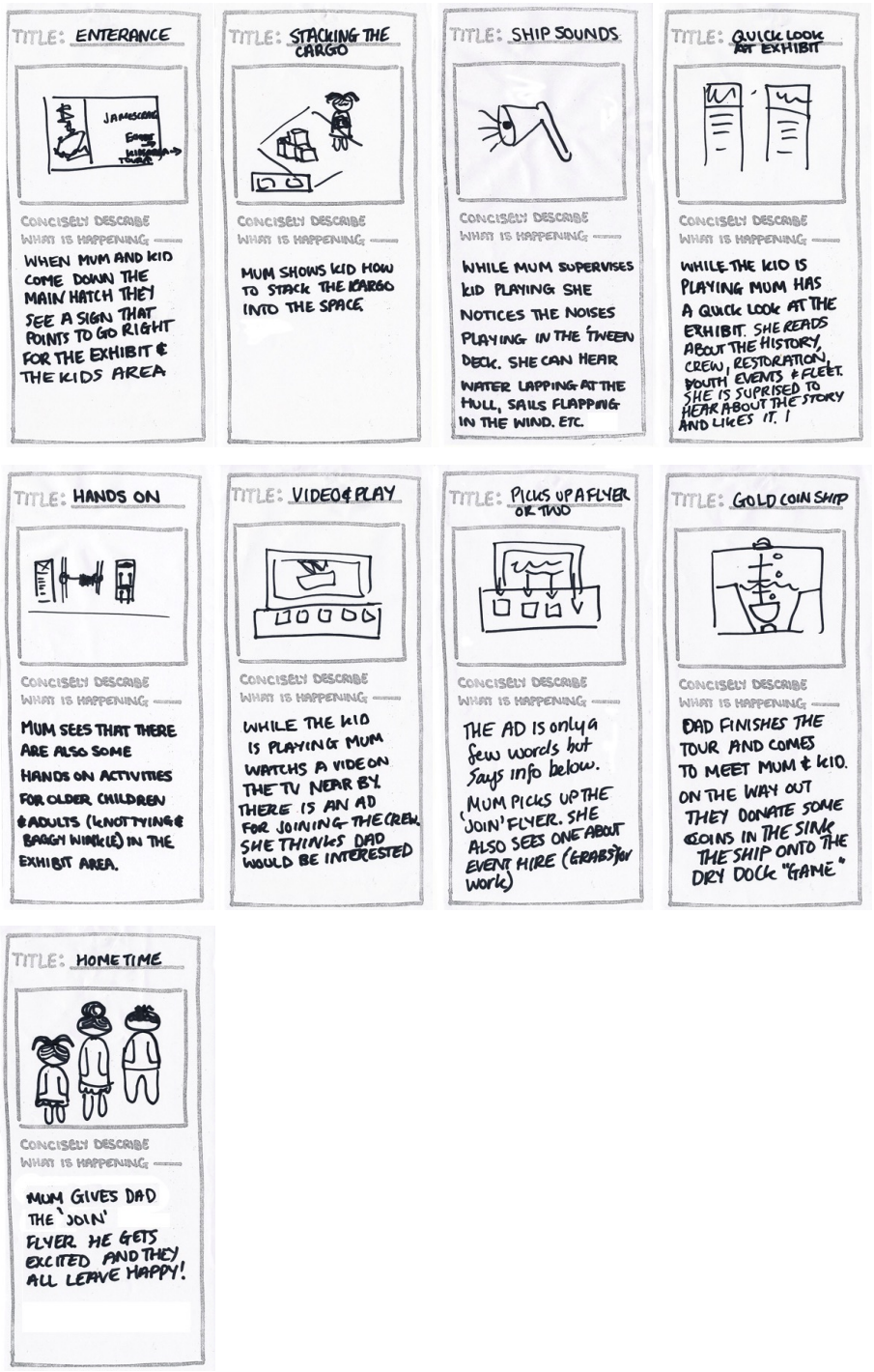


Figure 20. The storyboard of the end-to-end user experience (IDEO, 2015i).

6.4 Prototyping

Prototyping is a powerful medium that allows for almost any idea to be shared in a tangible format (IDEO, 2015h) so that feedback can be gained from end users as the design develops (IDEO.org, 2015). The fast paced cyclical process of testing, getting feedback and iterating allows for designers to learn from failure (IDEO, 2015h) and facilitates the discovery of opportunities and complexities that would otherwise lay dormant (IDEO.org, 2015) allowing designers to arrive at innovative and effective solutions (IDEO, 2015h).

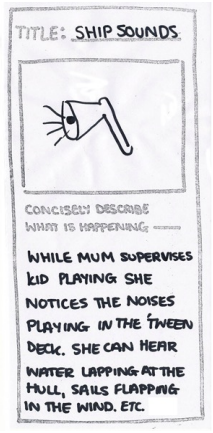
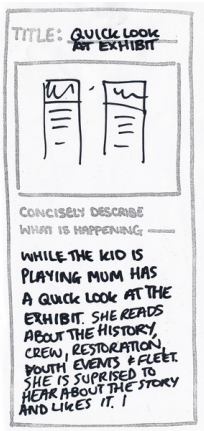
The goal of prototyping is to begin with the construction of a low-resolution prototype (IDEO, 2015i) to check the feasibility of an idea (IDEO.org, 2015) and then increase the quality as opportunities for improvement are identified (IDEO, 2015i). There are several different kinds of prototypes that can be used to bring an idea to life such as models, mock-ups, diagrams, stories and role playing activities (IDEO, 2015h).

6.4.1 Determining what to prototype

Each component in an end-to-end experience will have unresolved questions that need to be answered in order to understand whether or not a concept will work in practice (IDEO, 2015h). As such, breaking apart a concept to test smaller components allows for the most important questions about the end-to-end experience to be answered quickly and efficiently without the time and resource burdens associated with bringing an entire concept to life (IDEO, 2015h).

The storyboard in **figure 20.** was broken apart to determine what to prototype on the basis of time constraints and material availability. Components relating to the guided tour were automatically ruled out so that the focus could be directed towards answering questions about new elements in the end-to-end experience. A total of four components were identified and then analysed to ascertain what needed to be discovered during the prototyping period as listed in **table19.**.

Table 19. Components to be prototyped with questions to be answered

COMPONENT		QUESTIONS TO BE ANSWERD
Ship Sounds		• Does the playing of ambient sounds encourage visitors to converse more when in the 'Tween Deck?
Exhibit	 	• Are visitors engaging with the exhibit? • Are visitors engaging with the content for long or short periods of time? • Are visitors able to navigate around the ship?

Baggy winkle		• Do visitors have an appetite for this hands on activity? • Are they able to follow the instructions independently?

6.4.2 Developing and testing the prototypes

In the true spirit of participatory design, *James Craig* volunteers were invited to participate in the prototyping stage of the design process, with two crew members volunteering to join the prototyping team. The volunteers were invited to take ownership of building and testing the ship sounds and baggy winkle prototypes as well as assisting in the building and testing of the exhibit.

In order to provide participants with adequate support during the prototyping process, a makeshift prototyping workshop was set up at the mess tables in the ‘Tween Deck on board the *James Craig* as illustrated in **figure 21.**.

Figure 21. Volunteers creating prototypes in the onsite makeshift prototyping workshop.

Working as a team, low fidelity prototypes were constructed using photocopies, markers, blue tack, paper, scissors and double sided tape as well as found materials such as coffee cups and tins. As a courtesy to visitors, a sign was placed next to the prototyping workshop to explain that a new exhibit was being tested. It asked them to keep an eye out for handwritten signs and invited them to provide feedback.

The volunteers were encouraged to take notes on all feedback and observations even if they were negative or conflicted with the goals of the prototype. Where possible the team discussed what was being observed and iterated on the fly to remove barriers, change behaviours or accentuate positive features in order to refine the prototypes for a final day of exhaustive user testing. Occasionally the team made the decision to eliminate or change parts of the design that were not working. Iterations and new elements were marked with a colour dot over the course of the week to indicate when they had been changed or added to the testing environment.

The following sections detail the prototyping process and outcomes for each of the components tested.

6.4.2.1 The exhibit prototyping process

6.4.2.1.1 Understanding visitor navigation and behaviour

Before creating the first iteration of the exhibit prototype further observations of the self guided tours were conducted to develop a deeper understanding of how visitors currently navigate around the ship.

At present there is a well-established route for visitors to follow with access to the Main Deck, Quarter Deck and 'Tween Deck onboard the *James Craig* (see **figure 22.**). The other areas of the ship are only accessed by crew as they are either too dangerous for the public or house equipment that could be tampered with. The preferred route illustrated in **figure 23.** was originally chosen to mitigate the risk of visitors falling down the companionway leading from the Quarter Deck to the saloon and officer's cabins. It quickly became apparent during the observations however that the intended route is not natural for all visitors.

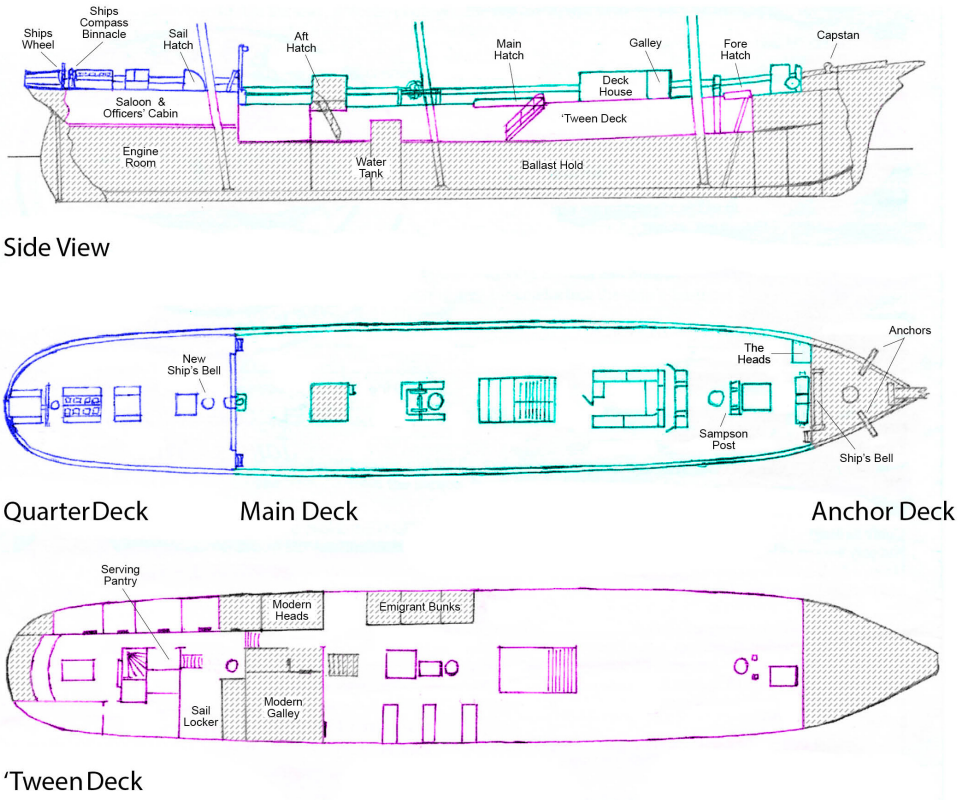


Figure 22. Side and top views of the *James Craig* indicating areas open to the public with points of interest labeled (Sydney Heritage Fleet, 2008).

On most occasions, self guiding visitors were given a map of the ship which included directional arrows as well as verbal instructions with accompanying hand gestures to illustrate the correct route. However, even with the aids and instructions provided the majority of visitors were unable to orientate themselves let alone follow the prescribed route.

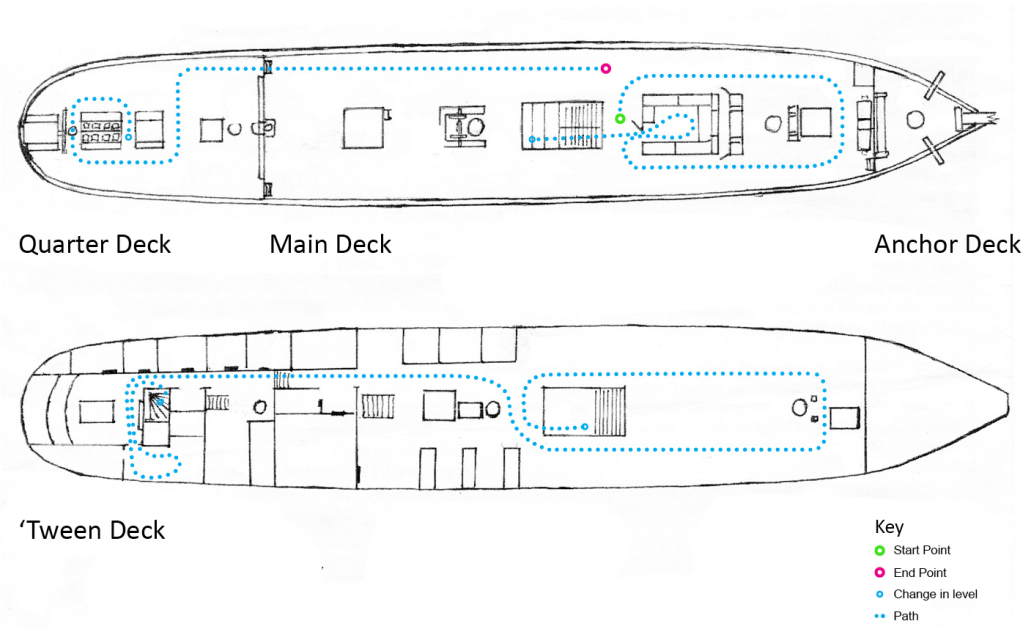


Figure 23. Top views of the *James Craig* indicating the path visitors are directed to take (Sydney Heritage Fleet, 2008).

The following behaviours were noted during the observations:

- visitors would duck their heads through doorways to view the rooms with very few actually entering them
- the majority of visitors did not venture into the fore section of the 'Tween Deck
- if visitors did venture into the fore 'Tween Deck very few ventured as far as the fore mast to peer down into the lower hold
- some visitors would venture into the fore (the front) 'Tween Deck far enough to view the video with some watching the whole 5 minutes of footage
- many visitors came down the main hatch stairs, looked at their map, then immediately resumed walking aft (the rear) toward the saloon and officers' cabins without looking back
- very few visitors ventured into the mess area on the 'Tween Deck
- many visitors opened the doors on the emigrant bunks to peek inside, usually opening the one without a sign and sometimes opening the one with a basic A4 laminated piece of paper saying "PLEASE DO NOT OPEN"

- some visitors looked at the self guided panels, others saw them and ignored them
- visitors tended to spend the majority of their time on the quarterdeck
- visitors would enter the deck house and walk through the galley on the main deck
- many visitors would stop to look at the large printed image of the ship under sail before heading towards the saloon and officers' cabins
- many visitors who stopped to look around at the base of the main hatch stairs would also read the information about the ship on a large wooden sign
- occasionally visitors would come down the main hatch, disappear aft and then return to exit up the main hatch, most without exploring the foreword section of the 'Tween Deck; and
- most visitors spent a maximum of 10-20 minutes exploring the ship.

With a deeper understanding of current navigation patterns and visitor behaviour the first iteration of the prototype could be developed.

6.4.2.1.2 First iteration of the prototype

The small selection of prototypes shown in **figure 24.** were created by re-using and compiling existing information about the ship and then posted in their corresponding area in the 'Tween Deck (see **figure 25.**) to act as a starting point for the exhibit.

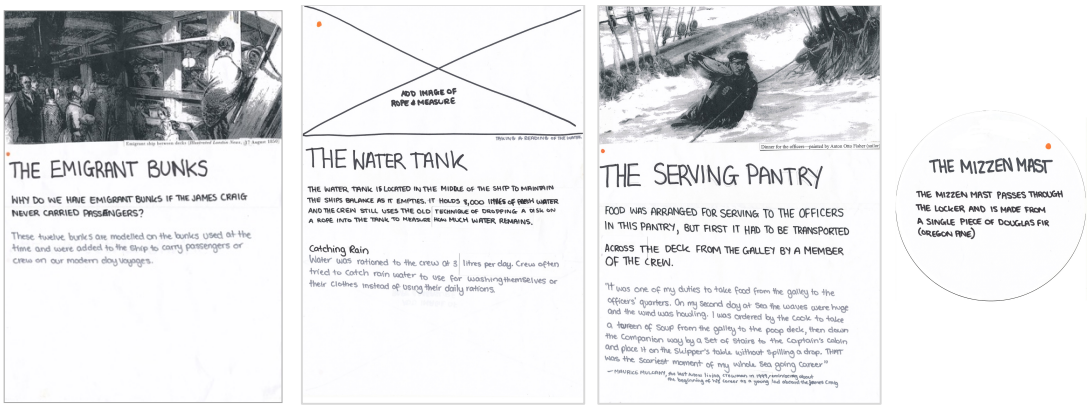


Figure 24. First suite of prototypes tested consisting of large rectangular panels and a small fact circle (C. *James Craig* Volunteer, personal communication, March 10, 2016; Sydney Heritage Fleet, 2015, p. Bosun's Locker; Sydney Heritage Fleet, 2015, p. Serving Pantry; Sydney Heritage Fleet, 2014, p.9; Sydney Heritage Fleet, 2015).

As it had been observed that many visitors opened the doors on the emigrant bunks to peek inside, the set of bunks closest to the main hatch stairs were cleaned out and propped open.

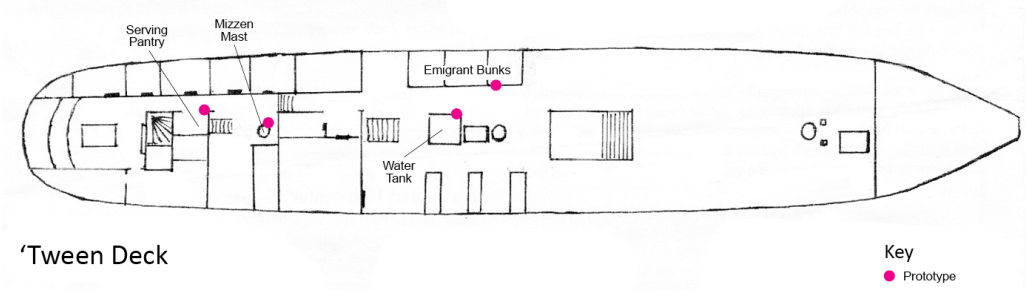


Figure 25. Location of first set of prototypes (Sydney Heritage Fleet, 2008).

The following observations were made over several hours:

- more visitors were reading the panels then before
- some visitors would poke their head into or enter the emigrant bunks to look around
- some visitors still opened the second bunk to look inside despite the basic A4 laminated piece of paper saying "PLEASE DO NOT OPEN"
- the serving panty panel placed in the hallway blocked traffic in the walkway if a visitor stopped to read it; and
- some visitors stopped to read the spot on the mizzen mast.

In response to the findings a handwritten sign that replicated the one on the third bunk was created and put up (see **figure 26.**). This effectively discouraged visitors from opening the second bunk. Next, the serving pantry panel was moved from the hallway into the pantry to stop the walkway from becoming blocked. Whilst observing the successful effect of this change it was noticed that the spot panel was being read more often by visitors than the larger rectangular panels.

Figure 26. The second bunk with hand written sign next to the open first bunk.

6.4.2.1.3 Second iteration of the prototype

Upon the discovery of the spot panels attracting more attention than the rectangular panels it was decided to test a new version of the prototype containing only spot panels to see if there was a visible difference in visitor behaviour.

The information contained on the rectangular panels was worked into a new set of spot panels with its own visual system (see **figure 27.**). Whilst developing the new spots in the prototyping workshop a mother and her children were observed completing the 'I Spy activity sheet'. To encourage exploration when interacting with the exhibit, a question was added to the mizzen mast spot. The new visual system established for the spot panels used black, red and grey text to distinguish between quotes, information about features and parts of the ship and questions for visitors to engage with.

Figure 27. Example of the visual system used on the new spot panels (C. *James Craig* Volunteer, personal communication, March 10, 2016; Keen, 1984a, p.22; Keen, 1984b, p.21; Sydney Heritage Fleet, 2015, p. Bosun's Locker).

The new spot panel prototypes were then reposted in the same locations as before and the following observations were made:

- more visitors were stopping to read the panels than they had the rectangular panels
- visitors spent more time in the area around the emigrant bunks and water tanks; and
- less visitors walked straight aft without stopping.

As a result of these observations the decision was made to continue with the spot panels and discontinue the smaller rectangular panels. It was assumed that the popularity of the spot panels was most likely due to the shorter length of text or because they were easily identifiable amongst all of the visual noise on the ship.

Over the course of the next few days additional spot panels were added to the ship to build a more comprehensive exhibit prototype. The process of adding spot panels around the ship began to attract the attention of volunteers conducting maintenance throughout the week. As a result several volunteers engaged with the process by contributing extra information, highlighting interesting parts of the ship such as tide marks (C. *James Craig* Volunteer, personal communication, March 10, 2016) or correcting mistakes on the spot panels. For example the ship's Bosun pointed out that the hatch on the saloon floor was once used to store the valuable food rations and now functioned as the engine room's emergency escape hatch (C. *James Craig* Volunteer,

personal communication, March 10, 2016). After the spot panel for this fact had been created and put up, an engineer pointed out that the prototype had "Can you see the hidden hatch on the floor?", which is technically incorrect as ships do not have floors. This valuable feedback lead to the spot panel being changed to "Can you see the hidden hatch on the deck?" (C. *James Craig* Volunteer, personal communication, March 10, 2016).

By allowing volunteers to participate in the curation of the content the collective knowledge of the volunteers was utilised to discover interesting facts. Incorrect information was also quickly picked up and changed throughout the process. This created a sense of ownership for volunteers when their information was incorporated into the prototype resulting in overall support and buy in for the exhibit.

After several days it was still being observed that very few visitors were venturing into the fore 'Tween Deck of the ship even if they were actively looking for the spot panels. As a result of this in combination with the earlier observations of a lack in interest in the smaller rectangular panels, the idea of creating large panels for an exhibit in the fore 'Tween Deck was aborted. Instead the historical and advertising information that would have been conveyed in those panels was incorporated into the spots panels.

6.4.2.1.4 Final iteration of the prototype tested

To conclude the prototyping process it was decided to thoroughly test the exhibit prototype by conducting a final day of exhaustive testing. This was planned for a Sunday so that the prototype could be tested by similar demographics of visitors to those targeted during the initial field research.

The final testing aimed to understand:

- how visitors were interacting with the prototype
- what changes had occurred in visitor behaviour
- what content appealed most to visitors; and
- what were the most frequently explored parts of the ship.

Before commencing the final testing, the old self guided tour was taken down and the full suite of spot panels was posted around the ship as illustrated in **figure 28.**. The guides were then briefed on what the testing hoped to achieve and were asked not to

hand out the old self guided tour map, but rather, to ask visitors to look for the 'fact spots' to learn about the ship. The guides were also encouraged to conduct their guided tours as normal so that the integration of the new exhibit with the exisiting guided tour could be tested.

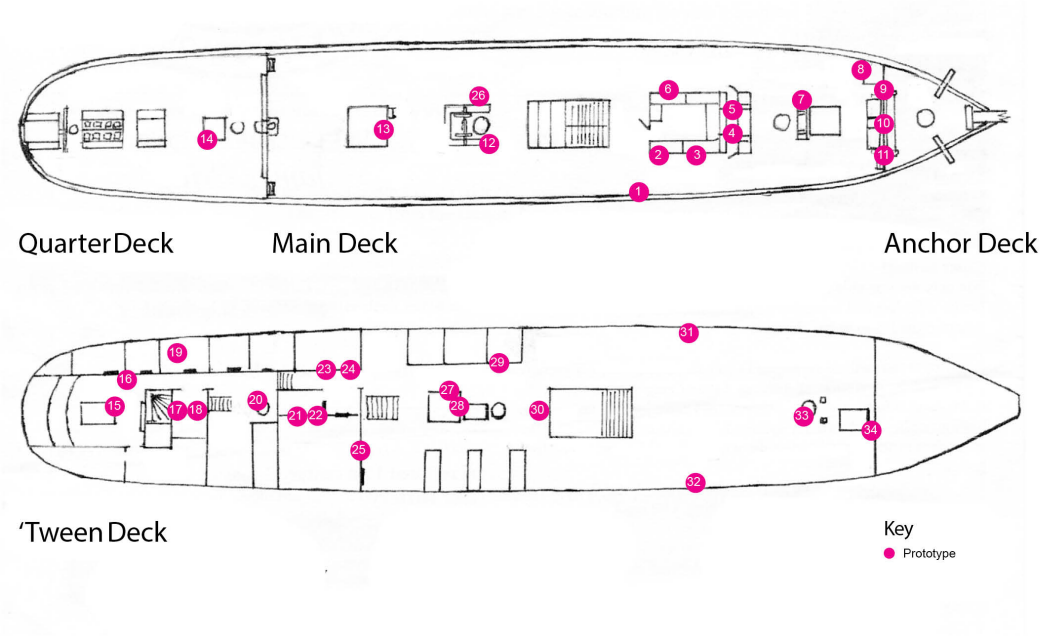


Figure 28. Location of spot panels on the final day of testing (Sydney Heritage Fleet, 2008).

During the testing visitors were informed that an experiment was being conducted onboard the *James Craig* to test the effectiveness of a new exhibit design. Visitors who showed an interest in the process were provided with the opportunity to curate the content, by sticking a green dot onto the panels they personally found to be most interesting or enjoyable. Enthusiastic children were also invited to participate by sticking a red dot onto each spot panel they could find in oder to identify which areas of the ship visitors did or did not explore. Visitors were also invited to provide feedback on the exhibit by sharing their thoughts with a guide or by adding comments to the 'feedback wall'.

One of the guides who had previously been involved in the field research as an interviewee and by helping to secure visitors for the survey was extremely interested in the testing process. As a result she kindly volunteered to take over the role of handing visitors stickers and accompanying instructions as well as asking and

reminding visitors to add feedback to the "feedback wall" when they were finished exploring.

The curation and panel spotting tasks completed by visitors revealed that:

- visitors were most interested in panels describing living conditions or tasks completed on board the ship
- visitors were not very interested in information about the physical tasks involved in restoring the ship
- visitors were interested in facets of the *James Craig's* life story
- spot panels that did not contrast with the surfaces they were attached to were regularly missed by visitors even in high traffic areas
- spot panels inside rooms were often missed; and
- visitors rarely found the panels in the forward section of the 'Tween Deck.

The spot panels tested and the exact results of each task conducted by visitors can be seen in **figures 29-33.**.

Location #30
(Toghill, 2013)

Figure 29. 'Tween Deck entry panel.

Location #3
(Sydney Heritage Fleet, 2015, p. *Clan Macleod - James Craig* History; Toghill, 2013, p.16)

Location #3
(Sydney Heritage Fleet, 2015, p. *Clan Macleod - James Craig* History; Toghill, 2013, p.18)

Location #3
(Sydney Heritage Fleet, 2015, p. *Clan Macleod - James Craig* History; Toghill, 2013, p.15)

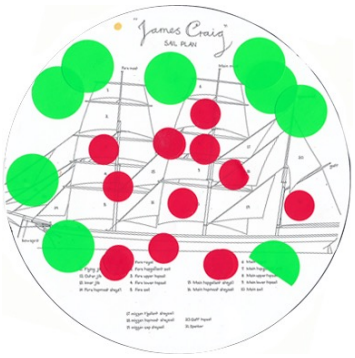
Location #3
(Sydney Heritage Fleet, 2015, p. *Clan Macleod - James Craig* History; Toghill, 2013, p.24)

Location #3
(Sydney Heritage Fleet, 2015, p. *Clan Macleod - James Craig* History; Toghill, 2013, p.24)

Location #3
(Sydney Heritage Fleet, 2015, p. *Clan Macleod - James Craig* History; Toghill, 2013, p.27)

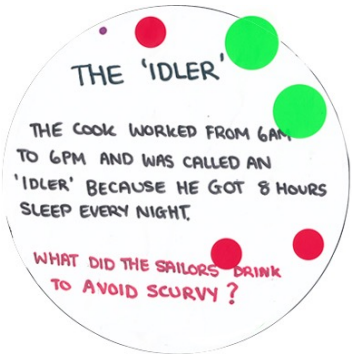
Location #3
(Sydney Heritage Fleet, 2015, p. *Clan Macleod - James Craig* History; Toghill, 2013, p.8)

Figure 30. The *James Craig's* story timeline panels.



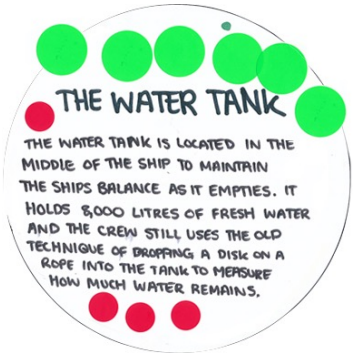
Location #12
(Toghill, 2013, p.88)

Location #4
(C. *James Craig* Volunteer, personal communication, March 11, 2016; Sydney Heritage Fleet, 2015, p. Galley)

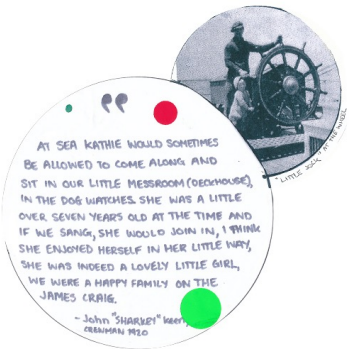


Location #5
(C. *James Craig* Volunteer, personal communication, March 11, 2016; Sydney Heritage Fleet, 2015, p. Galley)

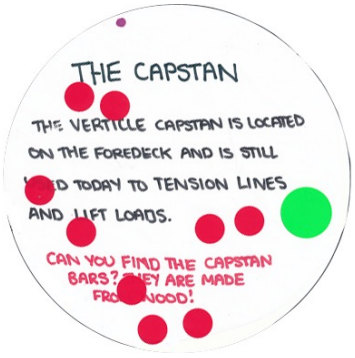
Location #15
(C. *James Craig* Volunteer, personal communication, March 9, 2016)



Location #27
(C. *James Craig* Volunteer, personal communication, March 10, 2016; Sydney Heritage Fleet, 2015)

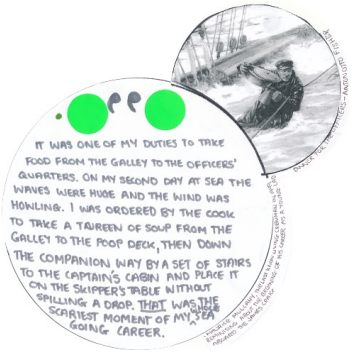


Location #16
(Keen, 1984a, p.22; Keen, 1984b, p.21;)

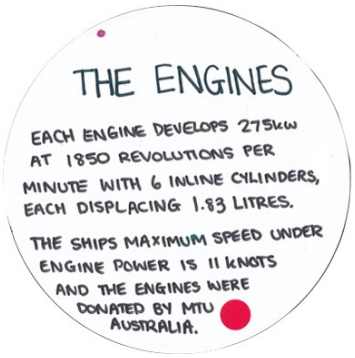


Location #9
(C. *James Craig* Volunteer, personal communication, March 11, 2016; Sydney Heritage Fleet, 2015)

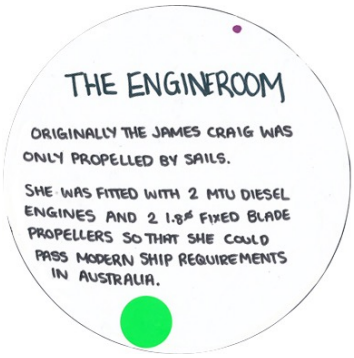
Location #17
(Sydney Heritage Fleet, 2015)



Location #18
(Sydney Heritage Fleet, 2015, p.Serving Pantry; Sydney Heritage Fleet, 2014, p.9)



Location #22
(Sydney Heritage Fleet, 2015, p. Engines)

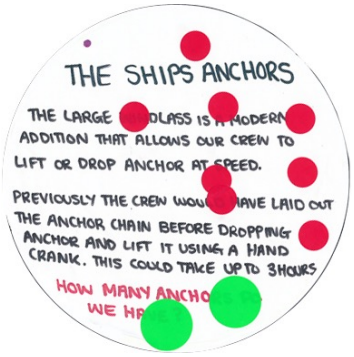


Location #21
(C. *James Craig* Volunteer, personal communication, March 11, 2016; Sydney Heritage Fleet, 2015)

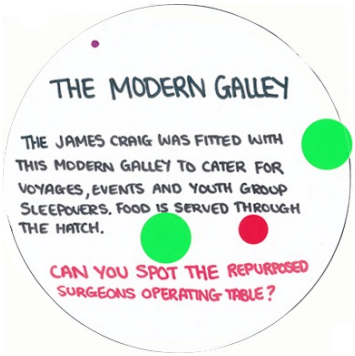
Location #34
(Sydney Heritage Fleet, 2015, p. Hold - Below Front Hatch)

Location #1
(Sydney Heritage Fleet, 2014, p.11)

Location #2

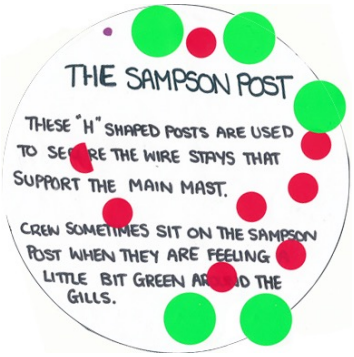


Location #11
(C. *James Craig* Volunteer, personal communication, March 11, 2016; Sydney Heritage Fleet, 2015)



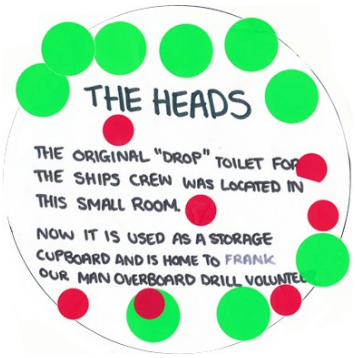
Location #25
(C. *James Craig* Volunteer, personal communication, March 11, 2016)

Location #14
(C. *James Craig* Volunteer, personal communication, March 10, 2016)



Location #7
(C. *James Craig* Volunteer, personal communication, March 11, 2016; Sydney Heritage Fleet, 2015)

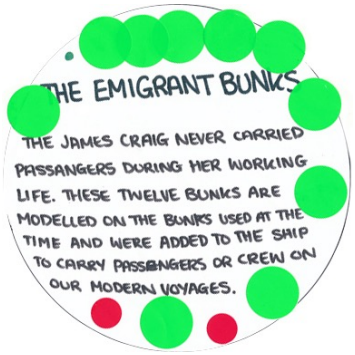
Location #23
(C. *James Craig* Volunteer, personal communication, March 9, 2016; Sydney Heritage Fleet, 2015)



Location #8
(C. *James Craig* Volunteer, personal communication, March 9, 2016; Sydney Heritage Fleet, 2015)

Location #20
(C. *James Craig* Volunteer, personal communication, March 10, 2016; Sydney Heritage Fleet, 2015, p. Bosun's Locker)

Location #10
(C. *James Craig* Volunteer, personal communication, March 11, 2016; Sydney Heritage Fleet, 2015)

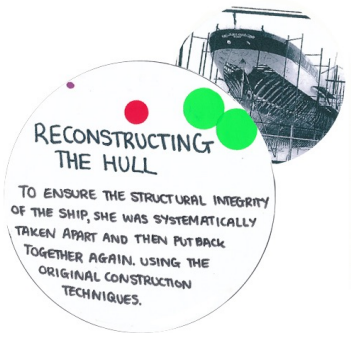


Location #29
(Sydney Heritage Fleet, 2015)

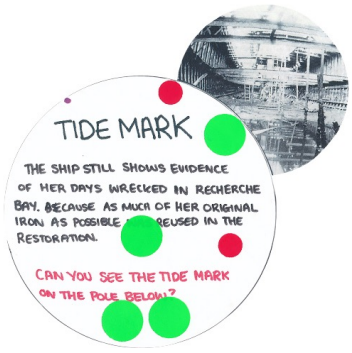
Location #19
(Sydney Heritage Fleet, 2015)

Figure 31. The ship's features and life onboard.

Location #32
(Toghill, 2013, p.62)



Location #31
(C. *James Craig* Volunteer, personal communication, March 11, 2016; Toghill, 2013, p.63)



Location #28
(C. *James Craig* Volunteer, personal communication, March 11, 2016; Sydney Heritage Fleet, 2015; Toghill, 2013, p.34)

Location #33
(C. *James Craig* Volunteer, personal communication, March 11, 2016)

Figure 32. The restoration process panels.

Location #24 **Location #6** **Location #13**

Location #26

Figure 33. Advertising panels.

Observations were also conducted throughout the day from a series of different vantages points to see how visitors were interacting with the exhibit prototype and the ship, with the following observations made:

- generally visitors would read several spot panels with some reading every one they located
- circulation patterns vastly differed from those observed before prototyping first commenced
- visitors choose differing routes as they freely explored the ship
- some visitors used the spot panels to determine their route

- The change in circulation did not appear to create any blockages even with groups of visitors going in different directions
- visitors were observed going down the companionway leading from the Quarter Deck to the saloon and officer's cabins
- many visitors spent in excess of 30 minutes exploring the ship, leading to an increase in the amount of visitors onboard at any one time
- there was a much more lively and relaxed atmosphere onboard the ship than had been observed previously, with some visitors coming to ask the guides questions multiple times throughout their visit
- there was more child lead exploration with some children physically dragging their parents along as they excitedly exclaimed phrases to the effect of "there is a sticker!" (children called the spot panels stickers).
- a new behaviour was observed where visitors tried to open the sail hatch on the Quarter Deck, something guides remarked they had never seen before
- visitors were entering cabins and other spaces such as the sail locker more frequently than previously observed
- a couple with limited English language proficiency, used the spot panels to navigate around the ship after a guide pointed to one of the spot panels and used a few simple words and hand gestures to ask them to follow the panels

Two iterations were made during the testing period in response to what was observed. The first of which was the creation of a danger sign prototype to deter visitors from using the companionway to get from the Quarter Deck down to the saloon and officer's cabins. When placed on the deck at the companionway entrance as illustrated in **figure 34.**, visitors coming up would briefly stop, read the sign and continue up where as visitors about to head down the companionway would look down, see and read the sign, and then head down off the quarter deck to use the main hatch stairs instead of the companionway.

Figure 34. Prototype created to deter visitors from going down the companionway.

Secondly, in order to prevent damage to the sail hatch as a result of visitors trying to to pull open the doors it was decided to move the spot panel from the front of the sail hatch to the side as can be seen in **figure 35.** The relocation of the panel effectively stopped visitors from pulling on the doors.

Figure 35. Movement of the sail hatch panel to deter visitors from pulling on the doors.

Visitors provided a range of feedback over the course of the day by either talking to the guides or by writing feedback onto a post-it note and leaving it on the feedback wall. Several visitors expressed to the guides that they would have liked more content on the panels about the old crew and more period images to help them visualise what life onboard the ship would have been like in the late 1800's to early 1900's.

The following feedback was also left on the wall and confirmed that the exhibit was well received by visitors:

- "Rounds stickers very good idea! Perhaps a little larger."
- "Round labels very informative, I learnt so much"
- "Circular timeline on deck was helpful"
- "Very educational notes, especially the red questions which gave the kids a task. I loved the quotes also"

One of the largest observed changes from the initial field research was that children were engaged and visibly enjoyed their time exploring the ship as reflected in the post-it notes (see **figure 36.**) that they left on the feedback wall.

Figure 36. Feedback received from children about their visit to the ship.

6.4.2.1.5 Final results from the exhibit prototype testing

The prototyping successfully answered the most important questions about the exhibit component of the concept. It confirmed that visitors were willing to engage with the exhibit, with some reading all of the content and that visitors were able to comfortably navigate around the ship when there was no longer a pre-determined route to follow.

The feedback received from visitors suggested that further work needs to be done before a final solution is implemented by curating the content, increase the size of the panels and adding more historical images.

6.4.2.2 Additional prototypes created by volunteers

During the prototyping period the volunteers in the prototyping team built and tested the ship sounds and baggy winkle prototypes as well as a knot tying station prototype. All of the prototypes were tested alongside the exhibit (see **figure 37.** for locations) during the final day of exhaustive testing.

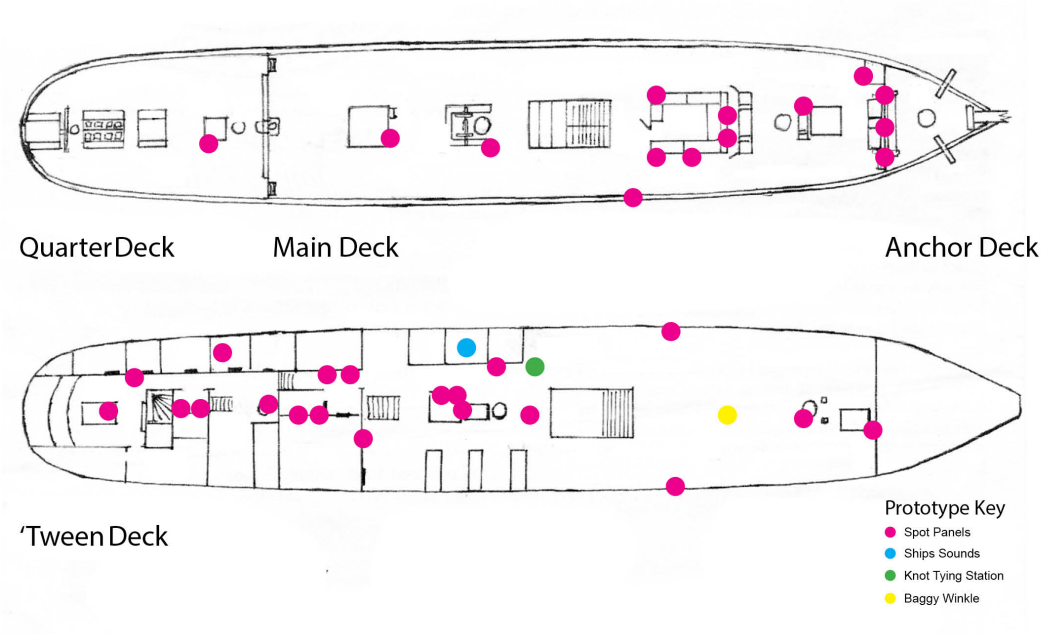


Figure 37. Location of the knot tying station, baggy winkle, spot panels and ship sounds prototypes on the final day of testing (Sydney Heritage Fleet, 2008).

6.4.2.2.1 The baggy winkle prototyping process

The baggy winkle prototype was created to encourage visitors to add a strand to a baggy winkle using the traditional technique of hand weaving scrap rope. During the final day of testing the prototype was placed in the foreword 'Tween Deck to entice more visitors into the space with the following observations made:

- a couple read the information about the baggy winkle and then examined it with their hands
- some visitors would read the information and then add a strand
- some visitors would read the instructions and then move on without touching the baggy winkle or adding a strand
- some visitors would nod or point towards the baggy winkle prototype and move into the foreword 'Tween Deck to view it
- during a guided tour one of the guides showed a father and his two daughters how to add a strand to the baggy winkle, with the daughters paying full attention but not adding a strand themselves; and
- a mother and son read the information and then worked together to add a strand each.

Figure 38. The baggy winkle prototype created by one of the volunteers using a collection of their own photographs.

The baggy winkle prototype successfully attracted the attention of the majority of visitors who ventured into the foreword ‘Tween Deck and on several occasions was responsible for drawing visitors into the space. This identified it as a suitable hands on activity to be added to the exhibit, however the prototype needs further development with a particular focus on the instructions as half of the strands were added incorrectly during the testing period.

6.4.2.2.2 The knot tying station prototyping process

Originally the idea of having a knot tying station did not make it through the idea selection process, however one of the volunteers involved in the prototyping wanted to build one to increase the number of hands on activities available to visitors. As the field research had revealed that visitors had a high preference for hands on activities it was decided to create the prototype with the aim of answering the following two questions:

Do visitors have an appetite for this hands on activity?

Are they able to tie the knots independently?

The prototype was constructed by one of the volunteers using scrap materials found onboard the ship, and provided visitors with the opportunity to test their skills by attempting to tie a sheet bend or fisherman's knot (as can be seen in **figure 39.**). The prototype consisted of a static example of each knot and additional lengths of rope for the visitors to use.

Figure 39. Knot tying station prototype created by one of the volunteers.

The prototype was set up next to the first emigrant bunk and tested during the final day of exhaustive testing (see **figure 37.** for location) with the following observations made:

- many visitors would stop to read or view the prototype before moving on
- families interacted with the prototype most often with parents attempting to tie the knots and then teaching their children; and
- children/young teens were unable to tie the knots without assistance.

It was also noted by a volunteer during the testing that the colour of the ropes used for fisherman's knot were inconstant between the example knot and the try-it-yourself ropes.

As the knot tying station facilitated social interactions between families, and provided an opportunity for children and adults to learn while visiting the ship, it is recommended that further steps are taken to develop the prototype so that a final solution can be rolled out in conjunction with the exhibit.

6.4.2.2.3 The ship sounds prototyping process

The original intent of the ship sounds concept was to create an environment where visitors would feel more comfortable to talk, after observations were made during the field research that the 'Tween Deck can be uncomfortably quiet resulting in less social interaction between visitors.

The audio loop for the ship sounds prototype was constructed by one of the volunteers by meshing together audio from their personal collection of video recordings taken on voyages and day sails. It contained a variety of sounds such as bird calls, wind gusts, sails flapping, waves running off the hull, crew calls, crew running on the deck and sailors snoring.

The prototype was set up in the second emigrant bunk (as illustrated in **figure 37.**) and tested over the course of several days including during the final day of exhaustive testing, with the following observations made:

- some children attempted to peer through the slats of wood to see into the emigrant bunks and spot the snoring sailors
- many visitors would say "is that snoring?" to others in their group, often resulting in a discussion followed by laughter when they were sure it was in fact snoring
- one couple patiently listened to the ship sounds together, identifying each sound one at a time; and
- more visitors were talking to each other when below decks then had been observed previously.

The ship sounds prototype notably encouraged visitors to converse more when in the 'Tween Deck, with conversations occurring much more frequently and freely then observed previously. As such it is recommended that further work is done to develop the prototype so that a final solution can be implemented it in conjunction with the exhibit.

7. Results and discussion

Upon concluding the inspiration and ideation phases it became clear that IDEO's human-centred design process provided a wholistic design approach that worked within the complex operating and social environment of the *James Craig*. Furthermore the process successfully answered the three questions put forth at the onset of this thesis:

1. If provided with the appropriate tools to express themselves, can volunteers successfully participate in the ideating, conceptualising and prototyping stages of the design process?

When provided with the appropriate tools to express themselves volunteers were indeed able to participate in the ideating, conceptualising and prototyping stages of the design process by:

- generating many creative and relevant ideas
- working together to select the most promising ideas to develop into a concept (although the approach to concept development needed to be changed in order to facilitate their ability to conceptualise the final end-to-end experience); and
- constructing and then testing a series of prototypes.

The workshop participants also expressed that they had thoroughly enjoyed participating in the process and were excited to see the outcomes of their endeavours. Volunteers that were unable to join the ideation workshop or prototyping team were also able to contributed to the process by:

- assisting in the user research
- curating content by providing interesting facts and identifying factual errors; and
- helping with the final testing.

The involvement of volunteers in this process allowed for the creation of a far richer solution then could have been developed in isolation and secured buy-in for a new way of working together to create positive outcomes for the *James Craig*.

2. Will involving volunteers in the design process help in securing funding for the implementation of the solution?

Involving volunteers in the design process did not directly assist in securing funding from the Sydney Heritage Fleet however, it did result in the project progressing through other means, as the visibility of this project allowed for a connection to be established with another project in progress at the Australian National Maritime Museum. This resulted in the exhibit component of this thesis being rolled into their project with the final solution implemented through a collaborative partnership in late 2016.

The merging of the two projects resulted in some changes to elements of the prototypes developed, but picked up on the key visitor feedback to provide more historical imagery and information about past crew and their lives onboard.

Involving volunteers throughout this process was crucial to positioning the new version of the exhibit when it was met with uncertainty, as it could be linked back to the original user research, and more importantly was a collaborative effort that many members of the fleet had contributed to.

3. Can IDEO's human-centered design process assist in developing a solution that works within the James Craig's *operational requirements and heritage listing restrictions?*

The field research and prototyping components of IDEO's human-centered design process were crucial in developing solutions that worked within the *James Craig's* operational requirements and heritage listing restrictions, as an understanding of what was possible was established up front and any modifications required could be made during real time iterations based on contextual observations of visitor behaviour and engagement with relevant stakeholders.

8. Conclusion

IDEO's human-centered design process was instrumental in the development of a solution that better communicated the *James Craig's* story and value to its visitors outside of the guided tour format. Volunteer participation in the process via a participatory design approach resulted in dynamic ideas, support for a new approach and the opportunity to progress the project into an implemented solution that is hoped to contribute to the ongoing successful operation of the *James Craig*.

9. Special acknowledgement

Special thanks to all of the dedicated volunteers and staff of the *James Craig* who added valuable input into this thesis project by donating their time and effort during the design process.

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