Kungshall: Creative Sanctuary
Mechanical Engineering 310 Fall Design Document

Team Decorative Gourd Season
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1 Executive Summary

Encouraging innovation in a creative space is a large and broadly defined goal. It’s challenging to say what will make a given team more creative, and even harder to guarantee the ability to do this across a variety of different teams using a space. Experienced designers may simply need a ‘getaway’ to help them focus and be comfortable generating radical ideas outside of their traditional workspaces; whereas less experienced entrepreneurs may need coaching through the entire design thinking process. Giving a team the wrong type of creative support could be redundant, frustrating, offputting, or confusing - so it is crucial to get this right.

Karlskrona is a small city on the coast of southern Sweden, which is 4 hours form Copenhagen, and 6 from Stockholm, the nearest major cities. On the island of Stumholmen, just east of Karlskrona, stands Kungshall, an old naval warehouse built in 1787. Michano AB and Volvo Construction Equipment have approached our team with the challenge of turning Kungshall into an environment that stimulates collaboration and innovation.

We have the opportunity to turn this remoteness and oldness from potential disadvantages into unique selling points, to transform this middle-of-nowhere warehouse into an innovation destination with a storied past, a ‘creative sanctuary’ where teams go when they need to be radically innovative. In order to attract teams across these great distances, though, Kungshall has to have much more than nice furniture – we need to go beyond just space design, and offer an enhanced experience: SPACE+.

Trying to define what SPACE+ could encompass has been the goal of this semester’s busy benchmarking, needfinding, and prototyping. We started by looking at existing creative spaces and technology solutions for supporting designers. Many of the spaces we visited, such as IDEO and SAP’s AppHaus, had SmartBoards and other augmented documentation technology, but reported that they were almost never used. Indeed, despite the range of options of technology available, the physical encumberance – the interference with the simple act of writing on a whiteboard – is high, and the added value is low in comparison. There seems to be a large need here: even top innovation firms such as IDEO have no established documentation tools or process for their design projects, and have senior designers that simply take pictures of Post-It notes with their personal smartphones. Often, these high-end firms have very subdued workspaces – they don’t demand much from the space, as the creativity comes from the designer. From interviewing design teams that have set up their own space outside of a corporate HQ, we discovered that often what teams need is simply a place to call their own, to escape the beauracratic overhead of a large and slow-moving corporation. Moreover, the simple feeling that a team is in a space for a special reason - a ‘special forces team’ feeling - can energize a team to perform at a higher level. From literature review of established design guides, it is important to remember that the physical space itself has much to offer - floor plans that encourage chance interactions between designers on different projects, or even configurations within a room that encourage movement, can introduce innovation and creativity into a space.

Our prototyping has addressed the critical function of hassle-free augmented docu-
mentation technology, and the critical experience of an environment that goes beyond the physical – with dynamically changing ambient stimuli – to change a team’s dynamics. For the first task, we created a tool that preserves the physical gratification and ease of use of a whiteboard, while providing seamless automated documentation of the designers’ output. Through this 'scrolling whiteboard’ prototype we have shown that there is room to make the experience of whiteboard writing better, not worse, and at the same time eliminate the anxiety of having to erase material or to stop work to take a picture. We also show through a small mock-up that we can add significant value in the form of an automatically digitized timeline of the material written on this table, that collaborators can comment on and tag with information.

To address the experiential challenge, we created a secluded room to prototype environments with a range of sensory stimuli. The results from testing of four different scenarios can be summarized in one extremely valuable insight: positive reinforcement via abstract visual and audio cues are the most effective in increasing a team’s brainstorming energy, because it focuses on inspiring the idea creators, and not the ideas themselves. This is in contrast to semantic cues such as related words or images, for example. Additionally, feedback control – using real-time information about a team’s activity level to influence the ambient stimuli – appears to be a promising next direction to explore. We have shown that it can have a very large negative effect when used with negative reinforcement - in the future, we hope to see if we can keep the magnitude but flip the sign by incorporating the key insight above.

The next steps are to start to think about how we might integrate these tools - so for instance, how ambient positive reinforcement might get incorporated into a scrolling whiteboard design - and how these features might be customized based on the needs of the user. As we figure out this technology, we need to simultaneously focus on how it can be integrated into this specific space, into Kungshall, keeping in mind the overall legacy and location of the space.

We envision Kungshall as a venue where a ‘meeting of minds’ will occur. We want to be an attractive site for corporate ‘special forces teams’ that just need a space to get away from HQ, as well as a supportive space for solo entrepreneurs or start-ups that need extensive design thinking coaching. Design ‘senseis’ will be doing the teaching, and will be drawn to Kungshall for its unique and ever-changing mix of teams and projects – for them, it is an observatory. The solo entrepreneurs and start-ups will certainly be looking for investment, and so we hope to make Kungshall attractive to venture capitalists as well – not only is it a space full of different teams and ideas, but it also integrates an easy-to-access documentation process that lets venture capitalists, collaborators, managers back at HQ, and the teams themselves, reflect on the project as well as their design process.
# Contents

1 Front Matter 2
   Executive Summary ........................................... 2
   Glossary ...................................................... 6

2 Context 8
   2.1 Need Statement ........................................... 8
   2.2 Problem Statement ....................................... 8
   2.3 Corporate Partners ...................................... 8
   2.4 Design Team .............................................. 9

3 Design Requirements 13
   3.1 Functional Requirements ................................. 13
   3.2 Physical requirements .................................... 15
   3.3 Business requirements (or Venture requirements) ....... 16

4 Design Development 17
   4.1 Documentation/collaboration technology benchmarking . 17
   4.2 Space benchmarking ....................................... 20
   4.3 Team dynamics benchmarking .............................. 21
   4.4 Critical Function and Critical Experience Prototypes (CFP/CEP) 23
   4.5 Annotated Timeline Mini-CEP ............................. 26
   4.6 Ambient Stimulus CEP ..................................... 27

5 Design Description 38
   5.1 Scrolling Table CFP ....................................... 38
   5.2 Ambient Stimulus CEP ..................................... 39

6 Planning 40
   6.1 Deliverables ................................................ 40
   6.2 Milestones .................................................. 40
   6.3 Project Budget .............................................. 41
   6.4 Project Time Line .......................................... 41
   6.5 Distributed Team Management ............................ 41
   6.6 Reflections and Goals ..................................... 42

Bibliography 43

A Space Benchmarking Visit Notes 44
List of Figures

4.1 existing technology for documentation and collaboration ................................ 18
4.2 inspiration for presenting complex information ............................................. 22
4.3 Photograph of completed Scrolling Table CFP ............................................ 24
4.4 Photograph of Scrolling Table CFP in use ................................................... 25
4.5 Timeline stitched together from photographs from Scrolling Table CFP .......... 32
4.6 Magnified view of a portion of stitched timeline .......................................... 33
4.7 Annotated Timeline CEP ................................................................. 34
4.8 Magnified view of a portion of Annotated Timeline ..................................... 35
4.9 Photograph of CEP room ................................................................. 35
4.10 Photograph of brainstormer interacting with projected fireworks board from Rhythmic Colors scenario ............................................................... 36
4.11 Screenshot of colored bars from Dominance Feedback scenario ................. 37
4.12 Screenshot of WordVis.com generated map of related words, centered around innovation ................................................................. 37
5.1 Dimensions of scrolling table skeleton ..................................................... 38
6.1 Budget .......................................................................................... 41
6.2 Project Timeline .............................................................................. 41
Glossary

**Design sensei** Highly experienced design thinking academics or professionals who come to Kungshall for a number of months to act as mentors or to use the space as a design observatory. These are the Marks and Larrys of our space. See Users.

**Space plus** What the Kungshall space can offer beyond the physical environment; something about the space that makes teams act differently than they would in any other setting and creates a truly unique innovation environment.

**Ambient positive reinforcement** Abstract cues provided by a space that encourage brainstormers. Our initial experiments have shown that Upbeat visuals and audio can energize teams, fill 'gaps' in talking to preserve creative flow, or make users feel that their ideas are 'sparkling'.

**Legacy** The way that the space communicates previous successes to inspire the current users of Kungshall. Inspired by the wealth of old prototypes and posters in the ME310 Loft.

**Alumni network** Tightly connected web of previous users of the Kungshall space, who can return to give advice or be reached out to for connections.

**Positive ambient stimulus** Abstract non-living stimuli (including light, sound, movement) in a brainstorm room or other creative space designed to energize and inspire teams. See prototyping: experience prototyping: ambient cues.

**Safe cave feeling** The experience of being in a small, enclosed brainstorming space that offers privacy and an escape from the outside world. We were shocked by how positively teams responded to having a space like this. See prototyping: experience prototyping: conclusions.

**Creative sanctuary** Our vision for what Kungshall would be for all user groups. See Introduction: Vision.

**Modular design thinking framework** One of the main offerings of the kungshall space, this contains the set of design thinking tools, techniques, and advice similar to what that students in ME310 receive, except that the offerings would be catered to the user’s needs to achieve the appropriate amount of hand-holding. See Vision.

**Hand-holding** The amount of design thinking guidance and feedback that a user of Kungshall should get, based on his experience level, in order to achieve a happy medium between getting the support he needs and recieving advice that feels so simple/obvious that it is boring, inane, or insulting. We are functiining under the general assumption that new would-be entrepreneurs will need far more hand-holding than other users. See also: Modular design thinking framework.

**Blocking behavior** Identified in Neeraj Sonalkar’s work as an action by a designer that inhibits a team's creative flow by shutting down a teammate's idea. See Benchmarking: Neeraj Sonalkar and Appendix: Interviews: Neeraj Sonalkar.
Knowledge broker The role of connecting a team with information about related or analogous projects, experiences, or work. This may be a person, a forum, or some element of the space itself. Based on the idea that some of the best innovation comes from recombination or repurposing old ideas. The main idea here is to inspire, avoid ‘reinventing the wheel,’ and save time/energy by creating connections between teams and sources of knowledge about a given problem space.

Unplanned interactions Unexpected interactions between different users of a space who would not normally collaborate, potentially leading to radical innovation. Might be created or supported by the Kungshall space design. See Benchmarking: Andy Switky and Appendix: Interviews: Andy Switky. Or see Pixar, which is famous for doing this.

Scrolling whiteboard A product we invented where a scroll of whiteboard material creates a writing surface that is continuously replenishable (as well as rewindable) with an automatically-triggered documentation device to capture material on it. See prototyping: physical prototyping: conclusions.

Special forces team This refers to the feeling we want to create for teams within our space. The theory is that a team who feels they are on a special forces task will behave like a special forces team - ie, perform better. See Benchmarking: Philipp Skogstad and Appendix: Interviews: Philipp Skogstad.

Corporate splinter team or corporate satellite team: One of our projected user groups, this is a team sent from a larger company such as Volvo CE to work on a specific project which is more creative or fast-paced than their normal corporate environment would support. See Users.

D.box A potential product we’re considering offering teams before they come to the space - a ‘starter kit’ to introduce them to design thinking before they arrive as Kungshall.

Solo inventor One of our projected user groups, solo inventors come to Kungshall with an idea for a product but very little experience in design or business. They require a large amount of hand-holding.

(Space) customization or tinkering Adjustments made to the physical environment of Kungshall by the people using it: the success of the community feeling in the space depends on individuals taking ownership of the space.

Meaningful idea Where to begin? In Kungshall’s quest to encourage creativity, it is essential not only to encourage a greater number of ideas, but to guarantee the quality of those ideas - i.e., not just generating nonsense ideas to meet numbers (although this approach does also increase the chance of getting a few more ideas out of the noise). Our current way to quantify 'meaningfulness' is by the number of other ideas a given idea leads/links to; this is because a 'good' idea should inspire other ideas, while a 'dud' idea should be a dead end.
2 Context

2.1 Need Statement

The formation of radical innovation teams within large established corporations, though much desired, is an uphill battle: the team has to swim against the surging currents of large inertia and burdensome beauracratic overhead. Team members are often assembled from different departments and sometimes even different countries, and have to work around the intersection of many schedules and timezones. Often, although experienced in their fields, these teams are new to design thinking.

Some teams have been succesful in solving these problems by going off on their own and establishing a seperate office. But the barrier to entry, both in terms of time and capital investment, is large, and the risk high.

What if they could simply rent a space to call their own, far away from meddling micromanagement? A space that is built to encourage innovation, where they can get design thinking help tailored to fit their goals. And it isn’t just corporate splinter teams that need a space like this – start-ups and solo entrepeneurs would find a home there too.

2.2 Problem Statement

The Kungshall warehouse was built in 1787 on a naval bastion off the city of Karlskrona in south Sweden. Nestled in coastal isolation, it is four hours east of Copenhagen, and 6 hours south of Stockholm, the nearest cities. It has served for hundreds of years as a munitions store – but now Volvo Construction Equipment and Michano AB have asked us to help transform it into a groundbreaking new innovation space.

It is paramount that we take advantage of both this storied past and this uniquely idyllic, if isolated, location. It has to have much more than just beautiful interior design and fancy furniture – what can we offer that would make teams travel this great distance to the middle of nowhere? What can we offer beyond just space – what can we offer that is SPACE+?

2.3 Corporate Partners

2.3.1 Volvo Construction Equipment

Volvo CE is a large and complex international company with a seemingly simple goal: build construction equipment. From diggers to backhoes and front-end loaders, they are world-leaders in several market segments, and are always looking to innovative advances to keep their edge. They want to improve their ability to be innovative, and so are very interested in the results and methods of the Kungshall project.
2.3.2 Michano AB

Mikael Blomqvist, founder of Michano AB, is a highly successful Swedish serial entrepreneur who founded and then sold two companies: Metget, an RFID technology firm, and Roxtec, a cable isolation manufacturer. Now, he is a board member at Blekinge Institute of Technology, and chairman of cloud storage company Compuverde. He is interested in understanding and stimulating the design and innovation processes, and is the primary investor in Kungshall.

2.4 Design Team

After a wildly successful Paper Bikes competition, the majority of Stanford’s famous Team 8 Domin8 decided to stick together for the corporate project. The Swedish side of the equation consists of three supremely qualified PhD students with valuable experience in innovation and sustainability research; although they were unfortunately not able to make it to Global Kick-Off Weekend, we have managed to start co-ordinating efforts through Skype and e-mails, and are starting to build enormous momentum for the Winter quarter. We will soon meet each other for the first time in Karlskrona!

<table>
<thead>
<tr>
<th>Eva Hoffmann</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.E. Graduate Student at Stanford University</td>
</tr>
<tr>
<td><a href="mailto:ehof@stanford.edu">ehof@stanford.edu</a></td>
</tr>
</tbody>
</table>

Originally from New York City, I came to Stanford five years ago to do my undergraduate degree. I started out in Human Biology (studying ecology and environmental change), but I have always loved making things and became more and more involved in Product Design, following along with the undergrad PD program until I was accepted as an ME Coterm MS student. I’m especially interested in affordable design for the developing world, and so its been really exciting to see my interests come together having a background in human health and environment/energy resources has been so helpful for all the projects I’ve worked on. After finishing my undergraduate degree, I took a leave of absence for a year to gain some work experience. During this time, I was briefly on a disease research project in rural Kenya; then working with an interior design firm in Cambodia; and then doing manufacturing work with some 310 alumni at Proximity Designs in Burma. My work in Burma especially cemented my realization of how important it is for me to have experiences like the 310 series...
so much more to learn about project management, working with corporate partners, and how to take products from problem statement to concept to implementation.

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I am from Vancouver, British Columbia, Canada. I did my undergrad at Princeton, where I majored in Mech E and minored in Visual Arts and some other random stuff like Physics. I love, love, love making things! I also love skiing. I have yet to do both at the same time, but I believe it would be a transcendental experience.

My core skills are graphic/CAD design/3d rendering and manual/CAM manufacturing. I love machine and wood shop, and am proficient with manual tools and also 3- and 4-axis CNC machines. I also have experience with programming microprocessors, 3d printing, and composites layup. www.finestructur.com is my personal webpage, and has lots of pretty pictures about stuff I have made in the past!

Aditya Rao  
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I am originally from Bangalore, India. I came to Stanford straight out of an undergrad in Mechanical Engineering (Design and Manufacturing) that I completed back home. I play a lot of sports, love Scuba Diving and taking apart stuff and putting said stuff back together (or not). I think my inclination for design stems from being a lego-addict as a toddler. I have always loved building and tinkering with things. When it came time to choose an undergrad major, I figured ME would be a great place to
start to get into creating and building products and eventually transition into Design. I have had a ton of design experiences during my undergrad including building an autonomous hovercraft that won us 2nd at National Competition. I also worked on building a pico wind energy harvester right from the ideation phase to building a fully working prototype. Some other amazing experiences were during my internship stints at 2 Design Consultancies and the Power Tools Design Dept at Bosch. They gave me an insight into how professional teams go through the design process and the nitty grittys of working with clients.

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Mikael is currently a PhD student at Malardalen University. He is working at Munktell Science Park at Eskilstuna, where he is conducting research on untapped innovation capacity in employees’ daily work. He has worked extensively as a consultant on innovation projects, has co-founded several innovation-focused companies, and holds several patents.

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Originally from Italy, Massimo is currently a PhD student at Blekinge Institute, where he is doing research in the Product Development Research Laboratory. He has an MSc in mechanical engineering from the University of Padova, Italy. He worked on his master’s thesis, ‘Creative Methods for Sustainability Driven Innovation’, during
an exchange program year at Lulea University, Sweden. Massimo previously played soccer in the 8th division of the National Italian Football association, and now enjoys coaching the sport. He also enjoys fishing, watching movies, and playing the guitar and harmonica.

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Originally from Sao Paolo, Brazil, Andre is currently a PhD student at Blekinge Institute, where he is doing research in the Product Development Research Laboratory. He received his Bachelor of Law from Universidade Presbiteriana Mackenzie in 2006, and a MSc in Strategic Leadership Towards Sustainability in 2008 from BTH.

He is interested in human and organizational development towards sustainability, and has previously volunteered for the Global Action Plan. (GAP) International.
3 Design Requirements

Introduction

How do we transform Kungshall into a Space+, an environment that promotes innovation? This was the central question we attempted to answer through our benchmarking and prototyping. And a compilation of our findings helped us formulate design requirements for Kungshall. While Kungshall is a space, we have attempted to formulate requirements for the Kungshall experience and not just the environment. The design requirements are enumerated in the tables below.

Note: Most metrics for our requirements were defined using results from a hypothetical experiment with 10 teams/users working in their original environments and then having them work in Kungshall (Space+)

3.1 Functional Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Metrics</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encourage feeling of creativity</td>
<td>Majority of users surveyed feel more creative when working in this space when compared with their previous workspace</td>
<td>Feeling creative and special is a first step towards making users better innovators. Special forces teams act special</td>
</tr>
<tr>
<td>Enhance productivity through positive ambient feedback</td>
<td>At least half of users surveyed feel like positive ambient feedback helped improve their productivity</td>
<td>It was found that positive ambient feedback/reinforcement help users be more productive and feel more productive</td>
</tr>
<tr>
<td>Encourage tangible output</td>
<td>A significant majority of teams have one or more physical prototypes or concrete conceptual designs at the end of their stay in the space</td>
<td>Teams that work towards tangible output have a higher probability to innovate</td>
</tr>
</tbody>
</table>

Table 3.1: Functional Requirements
### 3.1. Functional Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Metrics</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Guide users through the design process</td>
<td>No user is stuck at a particular stage in the process because they do not know the next logical step</td>
<td>It is important to give a team adequate support through the design process so that they do not lose their way at any stage.</td>
</tr>
<tr>
<td>Make users comfortable with the design thinking process by giving them adequate training</td>
<td>All users know the different stages in the process and apply it to their problem space</td>
<td>Teams tend to be more innovative if they follow the design thinking process. To get users to actually use the design process it is important to teach it to them and get them to believe in it.</td>
</tr>
<tr>
<td>Seamless auto-documentation process that adds more benefit that annoyance</td>
<td>$\frac{\Delta Value}{\Delta Annoyance} \gg 1$ (3.1)</td>
<td>Documenting the design process manually is difficult and is breaks the flow of the process. Being able to do it automatically, while adding value is beneficial especially as an empirical record of the process for future use.</td>
</tr>
<tr>
<td>Make users feel safe to express themselves in the space and adopt it</td>
<td>All users customize their space within 3 days of moving in</td>
<td>Only once users feel safe in their environment will they be able to truly unlock their creative potential</td>
</tr>
<tr>
<td>Promote knowledge sharing through interactions with others</td>
<td>A majority of users who needed help in domains outside their expertise received it from another user in the space</td>
<td>We found that peer learning and inter-disciplinary collaboration can accelerate innovation for teams</td>
</tr>
<tr>
<td>Must educate and encourage users about the usage of prototyping resources</td>
<td>All users know how to operate and use a majority of all prototyping resources in the space</td>
<td>Prototyping is integral to the design process and providing users with the knowledge and guidance to prototype breaks down any barrier and encourages the activity</td>
</tr>
</tbody>
</table>

Table 3.2: Functional Requirements contd

### 3.1.1 Functional Opportunities

- Incorporate existing technologies to facilitate creativity and collaboration.
- Attract design professors/researchers to the space
  - As design professors/researchers have experience with the design process, they can guide teams through the process
  - They can also use the space as a design observatory to conduct design research
3.2. Physical requirements

- Attract investors by having an observatory that showcases a high-density of innovative ideas.
- Incorporate the naval history of the town of Karlskrona and the buildings history as a storehouse into the design

3.2 Physical requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Metrics</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space is customizable</td>
<td>Significant majority of furniture can be easily moved around</td>
<td>A customizable space is important to help teams tinker with it and make it their own</td>
</tr>
<tr>
<td>Have adequate prototyping resources and facilities</td>
<td>Users can make any functional prototypes of a certain resolution within the facility</td>
<td>As prototyping is integral to the process, having all resources available on site makes it more accessible activity</td>
</tr>
<tr>
<td>Basic technology infrastructure for communication</td>
<td>Any user can communicate with a target user outside the space with ease</td>
<td>The ability to connect to people and resources outside the space is integral to a teams success</td>
</tr>
<tr>
<td>Have enough casual space in between work areas that facilitates unexpected interactions</td>
<td>A third of users surveyed said they were able to network with a new person through an accidental/unexpected meet</td>
<td>Unexpected and accidental meetings can spawn instantaneous brainstorming and knowledge exchange sessions that have value as they bring fresh perspective to a problem</td>
</tr>
</tbody>
</table>

Table 3.3: Physical Requirements

3.2.1 Physical Constraints

- Kungshall is in Karlskrona, Sweden, which has limited access.
- Kungshall is a 3 floor building with a total built up area of approximately 500 sq.m

3.2.2 Physical Opportunities

- Take advantage of remoteness of space and market it as a creative sanctuary.
3.3 Business requirements (or Venture requirements)

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Metrics</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kungshall needs to establish a local network of vendors for resources</td>
<td>Any resource in Kungshall can be replenished within 1 week by a local vendor</td>
<td>To be sustainable and smooth working, Kungshall needs to be able to source all resources easily</td>
</tr>
<tr>
<td>Needs to be profitable in 5yrs</td>
<td>All capital investments are recovered within 5yrs</td>
<td>To be a successful venture, Kungshall creative sanctuary needs to be profitable.</td>
</tr>
<tr>
<td>Needs to establish brand value</td>
<td>Majority of companies surveyed would send teams to Kungshall when faced with an innovation challenge</td>
<td>To become successful and attract users, Kungshall needs to establish itself as the quintessential innovation destination</td>
</tr>
</tbody>
</table>

Table 3.4: Business Requirements

3.3.1 Business Constraints

- Needs to have a constant revenue stream to meet expenditures

3.3.2 Business Opportunities

- Partner with a design university such as Blekinge (or Stanford) to help during set-up stage.
- Partner with innovation centers outside of Sweden create a network for knowledge and innovation sharing
- Replicate the Kungshall model in other countries and create an innovation brand
- Partner with design consultancies who could help innovators in the space and add to the brand
4 Design Development

4.1 Documentation/collaboration technology benchmarking

Our team started our technical benchmarking by searching for existing solutions (see 4.1) that help teams collaborate and record their process. While there is a variety of technology available, there are few clear 'leaders' in the field. Some tools improve collaboration and creativity by helping users communicate and record their ideas, but few try to actually improve the quality of the ideas generated. In other words, they are designed to be seamless, invisible tools that 'free users up' to innovate without interfering with creative flow. However, even the best-designed tools must have some level of intrusiveness, and the accumulation of annoyance over time is a very difficult barrier to foresee and overcome.

\[
\int \text{annoyance} \, dt
\]  

(4.1)

We wondered about the potential to reframe this - if we were going to intrude anyway, we might as well do it in a way that could provide enough added value to make the intrusion worthwhile. In essence, we have been assuming that the function determining the success of digital collaboration and documentation tools is:

\[
\frac{\Delta \text{Value}}{\Delta \text{Annoyance}}
\]  

(4.2)

and to maximize this value, all existing methods focus on reducing annoyance. But we have come to realize that focusing on added value may open more possibilities than the former approach. What if these tools could induce creativity, rather than just support it?

4.1.1 Whiteboard tools

A number of "modified whiteboard" tools are available, but these generally either offer very little added value or are complicated to use. A company called Plus makes a scrolling whiteboard (with a physical design quite similar to ours, described in section ??) but the design does not do anything beyond physically scrolling, and only scrolls in a loop around the board (i.e., offers only twice the writing surface of a normal board), so does not physically preserve the written record.

Other tools that offer more added value, but their barriers to use generally tend to be high. Many require an initial investment of time to learn the technology, and even the most intuitive ones take enough time/energy to start using that designers do not bother with them. SmartBoards, for instance, are probably the most pervasive form of high-tech whiteboard: we saw them at every creative space we visited for our benchmarking, but the boards were never in use. Of the spaces we visited, Wallenberg Hall was probably the most successful at infusing technology into its users' activities, and this is because all of the technology in the space is explicitly designed to lower the barriers to use [4].
4.1. Documentation/collaboration technology benchmarking

Figure 4.1: A variety of technology is available to designers, but these tools struggle to find a balance between adding value and being intuitive or physically gratifying. Quindi.com (upper left) requires a moderator making a constant effort to document key moments and the software captures too much information without filtering it; Twiddla.com (lower left) makes collaboration easy but does not store information about the designers’ process; scrolling whiteboards (upper right) focus purely on the physical design without any added value; and SmartBoards have added value but the technology presents a high barrier to use and compromises the user’s physical experience.

While no one would say that the technological barrier to using a tool such as a Smart-Board is insurmountable, over time the annoyance of using these tools accumulates:

\[ \int \text{annoyance} \, dt \]  

(4.3)

Products that try to incorporate technology with the physical whiteboard experience are not designed with the user’s physical experience in mind. As the novelty of these tools wears off and annoyance with this unrewarding physical experience grows, designers turn back to traditional tools and the technology falls into disuse.

There are also some purely technological 'whiteboard' tools, and these may be more successful because they do not try to replace traditional whiteboards and are designed to be used in situations where a whiteboard would not be appropriate. For instance, Twiddla.com is an online "Meeting playground" that allows multiple collaborators to edit the same page. Users can set the background with a variety of media, so they can mark up websites, images, or articles, while chatting via voice or text. The flexibility of media
input made this one of the most intuitive and practical solutions that our team found; it achieves a relatively seamless integration of technology and 'whiteboard'. It is an idea that we would consider borrowing, especially to facilitate any remote collaboration that needs to happen at Kungshall. However, it does not record anything about the process or the conversation, and the marked-up 'whiteboard' gets erased unless users save and store it themselves.

4.1.2 Documentation tools

Very few tools exist for designers to record their process: our team’s most shocking insight from a tour of IDEO Palo Alto was that there is no established documentation protocol [7]. Each designer is responsible for recording his own design process as he sees best - often simply with iPhone photographs - and so the process recording for a project varies drastically from designer to designer. Although challenging to tackle, Andy emphasized that this is a huge opportunity.

One of the best options for documenting meetings is Quindi.com, a platform for online meetings that records audio, notes, slides, screenshots, and photos, with time-stamping so that users can later review a meeting recording, jumping to 'highlights' with all of the recordings for that time synchronized. There is also technology that (less thoroughly) records smaller amounts of information, including apps such as Catch which help designers capture ideas (via notes and photos) on their mobile devices - and share these with teammates.

These tools are probably the best available for documentation, and still they present serious limitations:

- **Moderator (or constant teammate vigilance) is required** - tools like Quindi are really best for when a moderator is assigned to take minutes at a meeting: someone constantly needs to be responsible for recording notes and deciding which images and screenshots to record. This is not only impractical for design teams with much longer and more frequent meetings; it would probably also hamper the creative process to have an outsider recording everything. There are few automatic or semi-automatic process recording options available.

- **No segregation of important information** - this sort of recording is appropriate for a concentrated meeting, but not for the design process of a team that meets for hours every day over a period of months. The sheer amount of information would be overwhelming: the technology would need to find a way to identify and tag key moments, insights, ideas, or conversations so that they could be easily recalled later. Currently, the Quindi moderator is responsible for deciding what a 'key moment' is and recording it manually - but what gets missed in this selection process?

- **No synthesis or other added value** - presumably, designers would be using these tools because they wanted to come back to the information later. Whether they need to recall it to present to someone else, or to remind themselves of their own process, it is extremely valuable to have some synthesis of the information. If the technology is collecting all of this information anyway, why not do something helpful with it? Are there other ways to use the information that platforms like Quindi collect - such
as providing users with feedback on their team dynamics or tips for how to increase creativity?

### 4.1.3 Process communication

Following up on the ‘synthesis’ opportunity mentioned above, another question that our benchmarking addressed was how we might communicate the wealth of information captured by a documentation tool. How might the detail of information be varied based on the needs of the user (i.e. how can we communicate a high-level understanding while still allowing someone to ‘zoom in’ on certain ideas and access more information)? We investigated how a few different designs accomplish this (see also 4.2):

- **SpicyNodes.org, Prezi.com, and MindMeister.com** are interactive information-mapping/presentation tools with clickable ‘nodes’ (populated manually with phrases or rich media) that grow to show more detail and other connections. This data structure helps make large webs of rich information manageable and interesting to view. We see these as technologies that our solutions could piggyback on, automatically feeding in images or phrases as designers proceeded through their process. However, we have to do further exploration into how these could accommodate an ever-changing, time-dependent, evolving map of information.

- **Photosynth.net, Zoom.it** support large images that can be magnified; these are other sites we might consider piggybacking on. Photosynth can handle panorama images, which might allow us to capture the linear chronology of a design process, with the capability to zoom in for more detail about a specific area.

- **Phylogenetic (evolution) trees** used to summarize idea generation could clearly communicate a multitude of idea streams simultaneously; the viewer’s attention is naturally drawn to the lineages that last the longest. This is an especially good way to communicate convergence of different ideas.

### 4.2 Space benchmarking

The problem of interior design for creative spaces is well-defined. *MakeSpace*, written by the designers of Stanford’s d.school [1], discusses how space layouts can encourage creative behavior and empower designers to take control over their environment - so for example, configurations that force teams to stand will promote energy and movement, which helps them communicate better via body language. But what our team found in our benchmarking visits was that innovation spaces designed for expert designers tended to be less radical than we had expected - IDEO designer Andy Switky stressed that it is the *people* that make a space creative, and not the objects in that space. The space should play a supporting role by providing basic functions such as making post-its and markers available. The only real ‘role’ he saw the IDEO space taking in their design had to do with the fact that it was specifically laid out to encourage unplanned interactions from different departments; this idea of fostering unplanned collaboration has also been explored extensively in the design of the Pixar headquarters [7, 2]. The importance of
4.3 Team dynamics benchmarking

Another aspect of improving collaboration that we considered was how to influence interpersonal dynamics on design teams. Our goals for this benchmarking were to learn what determines good dynamics, how observers might rapidly quantify dynamics to provide real-time feedback (i.e., not by watching hours of video footage later in time), and how Kungshall might go about encouraging good dynamics.

One aspect of this was to observe ourselves and our classmates during our design meetings: our team set up cameras and reviewed sections of our brainstorming sessions, both at normal speeds and as timelapses. We found that even just watching oneself interact with others can provide a lot of insight into our individual effects on team dynamics. In general for any team, body language is surprisingly simple to read and can provide a good sense of how engaged team members are - even over a Skype conference. Automatic interpretation of body language may allow us to provide real-time feedback about team dynamics, or to identify 'key moments' of excitement to record in an automated documentation process.

In looking how we might quantify or record the success or positiveness of a team’s social experience, we came across Neeraj Sonalkar, who has developed a vocabulary (inspired by improvisational theater) to describe team member’s actions in relation to each other. Interestingly enough, he said that just the awareness that this language exists is sufficient to change the way that designers act in team environments. Another finding from his work challenged our initial assumption that improving team dynamics necessarily meant avoiding certain actions - like 'blocking' - which inhibit a team’s creative progress. Neeraj raised the point that what makes a team successful is not preventing these behaviors, but giving teams the tools to cope with them - i.e., to overcome blocks and continue moving forward with the creative process. This led our team to start thinking about how we might incorporate some sort of sensitivity or block-overcoming training into the Kungshall experience.
Figure 4.2: *Inspiration for possible ways to present a wealth of information at variable levels of detail: (clockwise from top left) SpicyNodes and Prezi both use clickable, zooming 'nodes'; biology’s phylogenetic trees could be used to demonstrate idea evolution; and Photosynth captures panorama photographs at high resolution with added details that users can zoom in to view. clockwise from top left, images courtesy of spicynodes.org; prezi.com; thinkquest.org; lucasbrouwers.nl; and fastcompany.com*
4.4 Critical Function and Critical Experience Prototypes (CFP/CEP)

4.4.1 Scrolling Whiteboard CFP Development

Site visits to design spaces revealed that augmented documentation technologies such as SmartBoards, and meeting capture software such as Quinid, are rarely used: although they create great value, they interfere too much with the simple, intuitive, physical experience of simply writing on a whiteboard. It seems that because this value is assessed at a later time, when you actually need to recall the information (such as the author’s present predicament), in order to encourage use it is more important to minimize the degradation of the physical experience than to greatly enhance the value of the documentation. So we are concerned with making the ratio:

\[
\frac{\Delta \text{Value}}{\Delta \text{Annoyance}} \gg 1
\]  

(4.4)

In creating this CFP, we wanted to address the motivating question: *Can we create a useful automatic, digital documentation system without degrading the physical experience?* We also saw the opportunity to push it one step further, and ask: *Can we enhance the physical experience of writing on a whiteboard?*

The team does our brainstorming on a table with a plastic dry-erase surface, which we find to be very useful. During brainstorming about possible automatic documentation paths, we became frustrated about running out of space and having to stop, take a picture, and then erase the board. We realized that this frustration was itself a needfinding nugget, and this led to the wish, *‘I wish we had infinite whiteboard space!’*. The team collectively became very excited about the idea of a ‘scrolling whiteboard’; after a series of ‘Yes And’ moments, in which interesting features of other ideas were synthesized into the Scrolling Table, a rough sketch of physical and functional requirements was created, as shown in Tables 4.1 and 4.2.

The prototype was built by combining an IKEA table with a 24’ roll of Go-Write Dry Erase surface, and a digital camera in a lightbox. A picture of the table shown in Figure 4.3; a picture of it in use is shown in Figure 4.4 More details can be found in ??.
4.4. Critical Function and Critical Experience Prototypes (CFP/CEP)

Figure 4.3: Photograph of completed Scrolling Table CFP

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Metric</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Writing on the scrolling table should be intuitive, and feel</td>
<td>There should be zero learning or adjustment curve for someone who is</td>
<td>Minimize annoyance</td>
</tr>
<tr>
<td>the same as writing on a white-board.</td>
<td>familiar with writing on whiteboards</td>
<td></td>
</tr>
<tr>
<td>Scrolling action should be intuitive</td>
<td>Should be able to look at table and discern functionality</td>
<td>Minimize annoyance</td>
</tr>
<tr>
<td>Scrolling action should be bidirectional</td>
<td>Should be able to show previous work and advance to new blank space</td>
<td>Maximize physical value</td>
</tr>
<tr>
<td>It must automatically capture written material</td>
<td>Should capture in digital form at high resolution – must be legible and high-detail.</td>
<td>Maximize digital value.</td>
</tr>
</tbody>
</table>

Table 4.2: Functional Requirements for Scrolling Table CFP
Figure 4.4: *Photograph of Scrolling Table CFP in use*
4.4.2 Lessons Learned

Testing was done by using table during team brainstorms. As well, two other 310 teams tested the table. With regards to goal of minimizing physical annoyance, it was found that:

- Anxiety about having to erase material when running out of space was avoided (+)
- Writing on the surface was close to exactly like writing on a normal whiteboard:
  - Dry erase behavior was good (+)
  - Surface sometimes was wrinkly, and did not stick to table properly (-)
  - Physical scrolling action was intuitive (+)
  - Physical scrolling action felt good: It was gratifying to signify progress in physical action (+)(+)

With regards to the goal of adding documentation value, it was found that:

- Having a physical record was useful, since one could scroll to find old work (+)
- Digital photos of physical record were not ideal:
  - Lighting conditions were bad and camera moved – stitching photos together was hard and not best result (-)
  - Resolution was not high enough (-)
  - Stitched digital record was very useful (+)(+)

4.4.3 Key Insights

We found that we were able to successfully minimize physical annoyance. Additionally, we also found that we enhanced physical experience: the act of scrolling and signifying progress was gratifying. This leads us to ask, in future work, How else can we use this positive reinforcement?

The stitched picture (Figures 4.5 and ??) was useful because it allowed us to review our work away from the table – we could put it on Dropbox and then look at it from anywhere. We could talk about it remotely through Skype with our partners in Sweden. In these usage scenarios, however, we found ourselves wishing that we could annotate the pictures. This inspired the question: What else can we do with this ‘idea timeline’? This question is explored in the Annotated Timeline Mini-CEP.

4.5 Annotated Timeline Mini-CEP

4.5.1 Annotated Timeline Mini-CEP Development

Using the stitched together timeline from the Scrolling Table CFP, we wanted to see what else we could do with it. From our experiences using it to communicate and collaborate with the Swedish team, we formulated an informal wish-list of useful features:
• It should be automatically uploaded on the web
• Users should be able to interact directly with it on the web
• Users should be able to add comments to parts of the timeline, and add comments to comments
• Users should be able to add details, such as documents, pictures, video, etc. to specific parts of the document
• Users should be able to ‘tag’ parts of the timeline as belonging to a certain task or thread of development

Implementing many of these things would be an involved process. To prototype the experience of looking back on such an annotated timeline, we mocked up and end-result in InDesign. It is shown in small size in Figure 4.7.

4.5.2 Lessons Learned

Having such a timeline appears to be useful to look back upon – our opinion is biased, but feedback from teaching team, TAs, and some 310 classmates indicate that the annotated timeline was much more useful than the timeline alone in understanding our ideation process. But it is clear that the user-user and user-timeline interactions that go into making the end-product is an important part of the experience – we need to figure out what about those are critical, and then prototype them next.

4.6 Ambient Stimulus CEP

In designing Kungshall, we wish to look further than just physical environment. One possible aspect of this is sensory environment.

Motivated by this, the most basic question our CEP investigated is: *How significantly can ambient stimulus affect team dynamics and creativity?*

There is a large knowledgebase for creating spaces that create either diverging or converging behavior – the hard part is knowing what kind of space the team needs, and then changing the space accordingly. If ambient stimulus does indeed affect team dynamics, then we can ask: *Can we combine real-time information about team dynamics and ambient stimulus to create a feedback control system for team dynamics by actively changing the space?*

We walled off a corner of The Loft with white curtains, and put speakers inside, and a projector on the outside. It can be seen in Figure 4.9.

Implementing such systems would be incredibly complicated. To prototype this, we used a Wizard-of-Oz method to implement four different ambient stimuli scenarios:

**Dominance Feedback**

_What does knowing who is dominating a conversation affect team dynamics?_
4.6. Ambient Stimulus CEP

Mechanism: Each person in a team is assigned a color band. At the start of the brainstorm session, they are all the same size. When a person starts talking, their color band starts to grow, and the others shrink. A screenshot of the colored bars is shown in Figure 4.11. Implementation: A moderator standing outside the room listens in and chooses which bar to grow in a simple software program.

Related Word Mapping

Can word-mapping provide background inspiration to augment teams’ creativity with related keywords? Mechanism: Project maps of words relating to keywords used in brainstorming sessions. Implementation: A moderator standing outside the room listens in and enters key words into WordVis.com, generating maps of related words. An example of a generated word map is shown in Figure 4.12.

Inspirational Images

Can we draw meaningful inspiration from images related to a conversation? How about unrelated images? Mechanism: Project selection of related or unrelated images. Implementation: We prepared beforehand images that were related to the topics that the team was brainstorming, and projected them in a slideshow with 10-second durations.

Rhythmic Colors

Can abstract color/movement/sound stimulate a team or steer its energy in certain directions? Mechanism: Play either fast-paced and/or slow-paced music, with rhythmically synced video. Try to schedule pace so that it is fast-paced at beginning and then slow-paced in middle of sessions. Can choose to increase pace when energy is lacking. Implementation: We prepared the synced visuals/music beforehand.

4.6.1 Lessons Learned

Dominance Feedback

We tested this with Team Edeka, having told them what the bars mean beforehand, but not which color belonged to whom. Overall, it affected them greatly, but was a thoroughly negative experience:

- They found this to be extremely stressful and distracting: “I spent 25% of my attention thinking about it (-)
- This stress caused them to panic or to want to say things that weren’t especially helpful, just to get their bar to grow (-)
- Some were more stressed when they weren’t talking enough, others were stressed when they were talking too much and ‘bullying’ others (-)
- They said that knowing speaking percentage as function of time could be useful.
4.6. Ambient Stimulus CEP

- They found it to be a discouraging form of negative reinforcement: “It feels bad to see your bar getting smaller” (-)

While it was a very negative experience, it was encouraging that the magnitude of the effect was great. Taking into account things learned from the other scenarios, a path forward with this scenario could include:

- Positive reinforcement instead of negative
- Observation of other metrics, such as movement or sound
- Subtle and slower-moving indicators, such as light level

Related Word Mapping

We tested this with Team EMN, having not told them what was going to occur in the space. Overall, it had little to no effect, but was sometimes distracting:

- Because the word maps were peripherally projected on the curtain and was mostly blank space, it was easy to ignore. Which was actually a benefit: They didn’t have to pay attention to it until they were looking for inspiration. (+)
- However when they did look at it for inspiration, it wasn’t useful: The words weren’t radical or far away enough from the conversation. (-)(-)

The lack of utility in this scenario mostly stemmed from the ‘related words’ lagging behind the brainstormfront. A path forward for this scenario should include ways to amend this:

- Occasionally project unrelated words
- Occasionally project antonyms rather than synonyms
- A smarter related word system – but this almost amounts to an automatic brainstormer

Inspirational Images

We tested this with Team Microsoft, having prepared a collection of both related and completely unrelated images beforehand. Overall, it was interesting at first, but had little effect after the images started looping:

- Pictures were distracting at the beginning: they had to pause conversation to process images (-)
- After that, pictures had little impact – not useful but not distracting either (-)

It was encouraging that the images were useful before they started repeating, but discouraging that they were mostly distracting and interrupted the flow of the conversation. A path forward for this scenario should address this:
• Images can be shown only when group activity level is low (integrating feedback mechanism from Dominance Feedback)

• Images should never repeat

**Rhythmic Colors**

We tested this twice, once with Clariant, and then with SAP. The test with Clariant showed a relatively small effect:

• Reactions to music were very subjective: “Fast is energizing” vs. “Slow helps me focus” (-)

• Easy to ignore the visuals: “too dark and to the side” (-)

During the test with SAP, there were a few differences: it was at night, so the visuals were a lot brighter relative to the room. Additionally, one of the curtains slipped, and the visuals were projected directly on the whiteboard rather than the curtain, as shown in Figure 4.10 This led to some very interesting findings:

• They really liked the *feeling* of the fireworks on the board: it “makes me feel like I’m doing something that is sparkling”, it was a “starry board of ideas”. (+)

• They related the fireworks with their idea formation: “It’s like think, think, more ideas coming out” (+)

• They warned that visuals could be distracting if they were semantic – it was good to not need to think about the images

• Music added energy and helped a lot when there were silences in brainstorm. (+)

• Music could be distracting when energy level was already high – makes talking over music harder (-)

These very encouraging results, though accidentally found, could (and should) be explored further in combination with findings from the other scenarios:

• Music should adjust to energy level – inject energy during silences, and quieten during active talking (feedback)

• Fireworks should somewhat be related to the brainstorming actions - for even better positive reinforcement, rather than just random patterns

• More immersive visuals and sound could be highly interesting

• Localized sound so that each person gets the kind of music that makes them energetic
Key Insights

Throughout all the scenarios, teams found the spatial experience of being within the curtains to be really beneficial. They liked the isolation, cosiness, and semi-privacy. It helped them focus, and get away from the craziness of the rest of the loft. This emphasizes the importance of space fundamentals. The cosiness is important, and suggests an important factor:

\[
\text{Cosiness Factor} = \frac{\text{Volume of Enclosed Space}}{\text{Number of People}}
\]  

The many findings from the scenario testing can be summarized by a few important insights:

- Ambient stimuli is indeed a very powerful tool
- Abstract cues are more effective and much easier to implement than smart semantic cues – they inspire the *idea creators* rather than the *ideas*
- And for inspiring people, positive reinforcement is much more effective than negative reinforcement
- Stimulus should depend on energy level of group – more when low, less when high; some form of feedback control could be promising.
Figure 4.5: Timeline stitched together from photographs from Scrolling Table
Figure 4.6: Magnified view of a portion of stitched timeline
4.6. Ambient Stimulus CEP

Figure 4.7: Annotated Timeline CEP
4.6. Ambient Stimulus CEP

@Mike: "Thanks, I'll be sure to keep these in mind!"

3:31 AM 27 Nov, Stanford (8 hours after capture)

Figure 4.8: Magnified view of a portion of Annotated Timeline

Figure 4.9: Photograph of CEP room
Figure 4.10: Photograph of brainstormer interacting with projected fireworks board from Rhythmic Colors scenario
Figure 4.11: Screenshot of colored bars from Dominance Feedback scenario

Figure 4.12: Screenshot of WordVis.com generated map of related words, centered around innovation
5 Design Description

5.1 Scrolling Table CFP

The scrolling table was created from a purchased table, PVC pipes, a roll of flexible dry erase board, a digital camera, and a light. A detailed parts list can be found in Table 5.1. The supply roller is created by offsetting a PVC pipe by 7cm from the left side of the table: a ‘C’ shape is constructed using one elbows, one T-elbow, two short sections of pipe, and one long section of pipe 1.5x width of the table, and screwing the ‘C’ to the table. The long pipe sticks out through the 2cm bore of the T elbow, and is the supply roller. It can be turned to rewind the roll.

The advance roller is constructed in a similar way on the right side of the table, except there is an extra static pipe 30cm away from the edge of the table. The roller itself is 7cm to the side of the table: the roll folds over the static pipe and then back on the roller. The section of roll between the static pipe and roller faces downwards. A box is constructed out of PVC pipes and foamboards around this section below the table. A camera is placed at the bottom, with a light.

Tension in the roll is achieved manually by moving the rollers in opposite directions. Picture taking is also done manually by triggering the Ziggi camera from a computer. Stitching of the timeline is done through Microsoft Image Composite Editor.

![Dimensions of scrolling table skeleton](image)

Figure 5.1: Dimensions of scrolling table skeleton
5.2. Ambient Stimulus CEP

Table 5.1: Parts List for Scrolling Table CFP

<table>
<thead>
<tr>
<th>Component</th>
<th>Number</th>
<th>Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>1m x 0.6m VIKA Table</td>
<td>1</td>
<td>IKEA</td>
</tr>
<tr>
<td>0.6m x 7.3m Dry Erase Roll</td>
<td>1</td>
<td>Go-Write/Amazon</td>
</tr>
<tr>
<td>1.25cm PVC pipe</td>
<td>2m</td>
<td>ACE Hardware</td>
</tr>
<tr>
<td>1.25cm PVC Elbows</td>
<td>8</td>
<td>ACE Hardware</td>
</tr>
<tr>
<td>1.25cm PVC T-Elbows with 2cm central column</td>
<td>4</td>
<td>ACE Hardware</td>
</tr>
<tr>
<td>3cm Wood Screws</td>
<td>10</td>
<td>Found in Loft</td>
</tr>
<tr>
<td>Ziggi Digital Camera</td>
<td>1</td>
<td>IPEVO/Amazon</td>
</tr>
<tr>
<td>Light</td>
<td>1</td>
<td>Found in Loft</td>
</tr>
<tr>
<td>Foam board</td>
<td>1</td>
<td>Found in Loft</td>
</tr>
</tbody>
</table>

5.2.1 Test Room

A 1.5m x 1.5m corner of the loft is walled off by hanging white curtains from wooden beams and plumbing. A projector is placed on a shelf and pointed towards curtain. Speakers are placed inside the room.

5.2.2 Dominance Feedback

Application is coded in Javascript/HTML/CSS and runs in Chrome.
6 Planning

6.1 Deliverables

<table>
<thead>
<tr>
<th>Deliverable</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper Robot</td>
<td>A mechatronic warm-up for the winter</td>
</tr>
<tr>
<td>Business Scenarios</td>
<td>Usage scenario for each user needs to be clearly defined</td>
</tr>
<tr>
<td>Preliminary Business Model</td>
<td>A rough business model for the innovation center</td>
</tr>
<tr>
<td>Dark Horse Prototype</td>
<td>A 2nd CFP that probes the edge of the design space</td>
</tr>
<tr>
<td>Overall Kungshall Experience</td>
<td>The experience of kungshall is determined and described in-depth</td>
</tr>
<tr>
<td>Funky Prototype</td>
<td>A CFP where a potential avenue for the final product is developed</td>
</tr>
<tr>
<td>Functional System Review</td>
<td>latest and greatest as Winter quarter draws to a close. It Should give a clear indication of what to confidently expect in June.</td>
</tr>
<tr>
<td>Winter Design Documents</td>
<td>Documentation for winter quarter</td>
</tr>
</tbody>
</table>

6.2 Milestones

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Planned Date</th>
<th>Actual Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trip to Kungshall</td>
<td>12/14/2012</td>
<td></td>
</tr>
<tr>
<td>Rough Prototype of solution</td>
<td>03/10/2013</td>
<td></td>
</tr>
<tr>
<td>Test Prototypes in Kungshall</td>
<td>03/25/2013</td>
<td></td>
</tr>
<tr>
<td>Pre-final Prototype</td>
<td>05/09/2013</td>
<td></td>
</tr>
<tr>
<td>User Testing</td>
<td>05/23/2013</td>
<td></td>
</tr>
<tr>
<td>Final Prototype</td>
<td>06/03/2013</td>
<td></td>
</tr>
</tbody>
</table>
6.3 Project Budget

Figure 6.1: Project Budget Expense Sheet

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date</th>
<th>Vendor Name</th>
<th>Description of Expense</th>
<th>Pre-tax Amount</th>
<th>Shipping &amp; Handling</th>
<th>Amount Incl Sales Tax</th>
</tr>
</thead>
<tbody>
<tr>
<td>11/5/2012</td>
<td>PEVO</td>
<td>USB Document Camera</td>
<td>$89.00</td>
<td>$96.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11/3/2012</td>
<td>IKEA</td>
<td>White Sheet Set</td>
<td>$34.99</td>
<td>$38.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11/18/2012</td>
<td>IKEA</td>
<td>Villa Table</td>
<td>$19.99</td>
<td>$21.64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11/15/2012</td>
<td>Amazon</td>
<td>GoWrite Dry Erase Roll</td>
<td>$28.49</td>
<td>$30.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11/15/2012</td>
<td>Amazon (Yagoonz)</td>
<td>Viking Hat (Decoration)</td>
<td>$26.85</td>
<td>$26.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11/19/2012</td>
<td>Ace Hardware</td>
<td>PVC Piping + Rotary Tool Kit</td>
<td>$51.50</td>
<td>$55.81</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$0.00</td>
<td>$0.00</td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>$269.68</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Fall Allocation: $1,000.00
Available Balance: $730.32

6.4 Project Time Line

Figure 6.2: Basic Project Timeline

6.5 Distributed Team Management

Being that our Swesish team are PhD candidates with diverse backgrounds and experience with business and innovation modelling, they will be taking the lead on the business aspects of the Kungshall center. They will continue to play a consulting role in all other aspects of design development. The Stanford will lead all prototyping and development efforts going forward. We will continue to interact and exchange notes through organized weekly meetings and will continue to use our blog as a continuous collaboration tool to exchange ideas and give feedback to each other.
6.6 Reflections and Goals

6.6.1 Eva Hoffmann

I love that our team is all really committed to the project and willing to do what it takes and put in the time to come up with results we are proud of. I feel like we have become good about being productive and efficient during work sessions when we need to be. In terms of the project direction, I love how open-ended our path forward has always been - this freedom lets us truly make decisions on the needs we discover while traveling and prototyping. I love feeling like we’re not locked into any one idea or path, despite the fact that this uncertainty can be scary at times.

I wish that I were better at managing my stress levels and not letting my worrying affect the team. I realize that I often get irritable when I feel overhelmed, and I notice that it really affects all of our moods. I need to be better at just relaxing and having confidence that our team will pull through and do a good job - because we always do. I also wish we had been able to spend a bit more time on our CFP, because there is a lot of potential there and I’m excited to take it forward and make it more real/automated. I’d also love to make some other very physical prototypes and get people to test them to see their interactions - I feel like we were the main users testing our scrolling table and I’m curious to see how others would respond to similar prototypes.

6.6.2 Aditya Rao

Given that our team worked on PBikes together, we were a well bonded team to begin with. As soon as our project started, we hit the ground running, and I like that all of us are very passionate about the project and are always talking about new ideas (even on the cold bike rides back home at 2am!). While the open-ended nature of the problem was daunting in the beginning, I think we have done a good job in handling that and distilling down to the most valuable and essential components of the projects.

On personal note I wish I would be more punctual with team meetings and getting work done. It only bogs the team down. While we have worked hard to try and be organised, I think we can definitely do a better job with that, especially with regards to documenting each stage (considering the meta-nature of our project). I also wished we managed our time better so we could have built multiple prototypes (of low resolution). Our user testing could have also been more extensive.

Going forward, I am very excited to see how our project unfolds and the direction we go take. Whatever our path I know our viking spirits will prevail!
Bibliography


Appendix A

Space Benchmarking Visit Notes

IDEO, Palo Alto - Andy Switky

- Focus on the creativity that happens between functional spaces: this is an issue that keeps coming up. Don’t underestimate the importance of collaboration that happens through accidental meetings, etc.
- They have no definite or simple method for process capture; everyone is responsible for recording their own brainstorming sessions, etc, and Andy was doing it by taking photos on his phone. Anything about the process they want to save just gets stored in file boxes or on their server; so documentation varies dramatically from designer to designer. We see a huge opportunity here.
- Presentations are a huge focus for them, because their clients are paying a ton of money for these services; they really believe in making these flawless. The try to make them look simple and clean but it actually takes a ton of work to do this.
- When asked whether new clients seem overwhelmed by their space/process, he emphasized the importance of having newcomers go through the design process once and experience the satisfaction that comes with the wrap-up at the end of a cycle, where all of a sudden, the ideas that seemed crazy get pulled back together into something exciting and innovative. Formalizing this process will be really important for communicating to funders or to the large companies which satellite teams come from.
- Importance of having a common language between different offices anywhere you go in the world, you’ll have these little baskets of sharpies and post-its available throughout the office. This is super important to support creativity anywhere, and is nice as a connection between offices in really different cultures.

SAP AppHaus, Mountain View - Philipp Skogstad

His key requirements for AppHaus space:

- Multidisciplinary, top notch, co-located people (co-location essential to move fast enough on their projects, arrange meetings etc.)
- Extremely short design cycles (he started AppHaus because needed to design something in 90 days and couldn’t achieve this at slow-moving large company (he calls this ”oil-tanker” corporate culture); especially important that everyone is physically close to make things move faster.
• Support the people and the process (space needs to be FLEXIBLE, EVOLVING, and INSPIRING)
• Space needs to give permission, so people not afraid to mess it up and take ownership (team defines their own space) he achieves this by looking unfinished

Challenging questions for us to address:

• How will we build a persistent culture, and make people feel truly engaged and responsible for the space, if we have a high turnaround? In general, if teams are rotating, their efforts may be more halfhearted because they feel that everything is only temporary.
• Consider HP's teleboard for remote collaboration benchmarking whiteboard+skype+recording - but the technology is a little complicated and for this to be feasible you'd need a devoted tech person. Who wants to put in that much effort/should you really have to?
• Key to AppHaus has been letting things go, allowing the space to grow organically (really hard for some cultures, especially Germans who like to plan).
• AppHaus works because it achieves the 'special forces' feeling on a team, making them perform a lot better. They need a sense of contrast between where they normally work and our special forces team space.
• Importance of Kungshäll coaches having a stake in the teams success: design services team did coaching for SAP teams around the world but never worked out very well; teams saw them as outsiders, low engagement. (Opportunity here: can the space act as a coach that subtly pushes teams in a direction? With coach, teams will 'nod and ignore', but space might have a unique advantage if 'pushes' are subtle enough...)
• One key for our space is peer learning. We should take advantage of shared space, and teams with seemingly unrelated projects may have a lot to learn from each other. Should be able to see/hear into other teams' spaces. (But: need to think carefully about privacy/IP issues with both startups and corporate teams maybe make the entire space subject to non-disclosure agreement? Or everything open source?)

Wallenberg Hall, Stanford - Robert Smith

• Tools like Copycat for auto-documentation of brainstorming sessions are just not working. Not transparent and a lot if people feel it is not worth investing the time to learn. Either need technologies that are ultra simple and approachable or else need some guarantee that they will stay the same over time (or, need it to be so widespread) that investment to learn them now is worth it.
• We need to be careful not to cloister the technology we develop in Karlskrona how will we make this a truly international place? Or go for the other extreme - pitch this as a retreat really away from all distraction. But then be aware that people won't be staying here for long.
• It's important that people don't worry they'll break the technology in the space, especially in Sweden where people tend to be a lot more polite. (Or if they do break it that's good! We want to know what went wrong to create better technology!)
Our space may want to have design practitioners/gurus who are always there, and responsible for being constantly meta like an IDEO deep dive team that is always around to help people out.

Making people happy/comfortable/unthreatened is far more important than technology do this and then all thats important is basic technology to support them.

Potential for technology to make teamwork more democratic/avoid having one leader. They arrange setups with multiple screens so everyone works simultaneously, and find that the students are much more engaged if they are simultaneously doing tasks related to the teacher’s task.

It is crucial to have a space that will adjust to future technology cable trays in Wallenberg mean it’s really easy to rewire everything when new technology comes in. Otherwise building gets outdated when the tech does.

Importance of having teams learn from each other. The teachers in Wallenberg benefit a ton from learning how other teachers have incorporated technology into their classes. Maybe we should consider designing an apprenticeship program where students or entrepreneurs can work with a company’s satellite team and learn from them.

Neeraj Sonalkar, Stanford Design Group PhD Graduate

There has been a lot of research into concept generation patterns, and a lot of research into designers interpersonal behaviors on teams, but very little research connecting the two.

The traditional idea, both in improv and in design, is that blocking behaviors on teams are necessarily bad. But this is not necessarily true; it is much more important to look at how other teammates negotiate blocks. What differentiates good versus bad teams is not the existence of blocking behaviors, but rather how they negotiate those blocks. Maybe rather than influencing how teams interact overall, we should focus on training members to negotiate blocks better.

Responding to a question about giving teams feedback - during his PhD research, he wasn’t giving feedback, but does do that in his current work and a lot of teams respond well. He hasn’t tried negative feedback yet about their behaviors, though only encouragement, and intervening in situations where he sees that something isn’t working. Its awkward at first, but he got used to doing it quite fast.

Improv theater is a great place to get inspiration for design team dynamics in general deals with the same question of what do you do in a space of not knowing, where the only option is to build on team members until you collaboratively find a direction for the team to move.

Being aware that these dynamics exist is enough to change the way people interact on teams his researchers feel this in their own work. Maybe we should consider sensitivity training for incoming teams?

Volvo Construction Equipment - Jenny Elfsberg interview by Mikael Johnsson, Munktell Science Park

Requirement/Demands: What requires would you have on Kungshall if they say they have an creative environment?
• Freedom to do what ever is needed on site.
• The less predefined the better for creativity, maybe an empty white space with hidden recourses that could be used when they are needed.
• Easy to see what is going on in a nearby industry, being a place in the reality or very good Internet connection.

*What competences would you require on site?*

• The character of a multifunctional/multidisciplinary group.
• A process you can trust on, that handles chaos.

*What requires would you have on the environment?*

• Have to be a relaxed place. Ordinary meeting rooms kill creativity. Tables, if needed, should be round.

*Positive approach: What would motivate you to send an iGroup to Kungshall?*

• If I knew there could be there, being focused on the tasks.
• Resources on site
• Processes and process managers. A person who can guide a group in a systematic way where chaos is OK.
• From sketch to demonstrator which could be made of clay or a virtual model

*What offers would you expect from Kungshall?*

• The facility by itself.
• The facility + process.
• Educating of process.
• Annual conference on creativity.

*Delivery: What would you expect an iGroup to bring back from Kungshall?*

• Education = \( i \) competence
• Concept (might take a few times) = \( i \) concept descriptions, illustrations

*Can you imagine VCE to visit Kungshall to get conceptualization in terms of illustrations and models if the total time was 1 week?* Yes, it doesn’t need to be a working prototype, model that explains functions would be good.

Approx. how much would you spend on a week like that? 200,000 SEK

*Can you imagine VCE to visit Kungshall to develop a prototype (pre-stage to production development) of e.g. steering device if the total time was 2 months?* Yes

Approx. how much would you spend on two month like that? 1,000,000 SEK

*Can you imagine VCE to gather a strategic team and visit Kungshall in purpose to conceptualize strategic directions during a time of one week?* Yes

Approx. how much would you spend on a week? 200,000 SEK on product level 1,000,000 SEK on company level if material can be used for marketing.

*Negative approach:*

• What problems do you see by sending an iGroup to Kungshall?
• Many would react on the remote location. Sweden is not the center of the world and Karlskrona in in the middle of nowhere.
• Make sure that you get something out of it. Specifications maybe
• Companies like VCE are driven by annual reports, events that doesn’t have obvious benefits for the company will be cut off.
• Explicit that its not just for fun to visit Kungshall

What would make you to not recommend Kungshall to someone?
• If the concept were to unclear. I like innovative product development but not reports.
• Not so into team building events.
• Paper products like McKinsey proposing changes are of no value.
• If I’ve tried if a couple of times and doesn’t get any concrete I’d be unhappy.

Except for VCE, what other companies would you expect to see at Kungshall?
• Would like to see telecom, healthcare. Completely different from VCE.
• I would like to learn from others than our selves, we are moving from products towards services so we have a lot to learn.
• I wouldn’t be afraid of competitors.

What would make you recommend Kungshall to someone?
• Imagine to send an iGroup where they work according to a process, the Raft-model maybe, and after a week they can present something. It doesn’t have to be a business case but they come back full of energy. I’d love that and it would be so important for the members in the iGroup.

How did you find the questions?
• Good, and it was fun

Is there something you’d like to add? It has to be a international feeling. VCE wouldn’t be very interested if its not. I can compare of my situation of going to Brussels when I have to present something.