HUMAN-CENTERED DESIGN CASE STUDY FOR A WORKSHOP AND WEB REPOSITORY

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Abstract

This case study covers the interaction and results achieved by a diverse group of Masters and Doctoral students at the University of Kansas working together to create a workshop on Human Centered Design and ultimately to build a web repository on the research and application of human-centered design. In addition to Design students, the students involved come from a variety of disciplines including education, engineering, cognitive psychology, and business. Data collected includes observations, interviews, surveys, audio-visual material, as well as work products, documents, and reports. The case highlights the diversity of students seeking graduate degrees in Design, their struggle to find an educational program to meet their needs, and most importantly, it illustrates how a multi-disciplinary approach can be used with Design students from varied backgrounds to develop real-world, authentic projects that have lasting value. The case discussion includes issues arising from trying to solve ill-defined problems, the struggle to build a team and unity with individuals from such varied backgrounds, the design methodologies and approaches identified by the group, and an analysis of quality and usability of the group's final work products. Finally, lessons learned and recommendations for future efforts are discussed.

Introduction

Graduate education in Design at the University of Kansas has evolved along lines similar to those at other institutions. In years past, the focus of design education has been on the artefact and the attributes of form, material and function. More recently, the focus has shifted from the object being designed to the design process, and more importantly, to the user of the object and the user experience of the object.

As the study of design expands from the simple physical realm, it is increasing important for the designer to gain insight from other disciplines and sources such as the social sciences, cognitive psychology, and ethnography. The designer must consider the psychological impact on the individual as well as the emotional and spiritual impact (Figure 1). In addition, it's increasingly important for the designer to recognize that the user is influenced by his/her membership in different social groups as well as impacted by local, regional, and global cultural issues.

[Place Figure 1 about here]

The world-view of the designer is shifting from asking questions like 'What?', 'How?', and 'What Is?' to 'What If?' The view is shifting from just creating something to deeply understanding the user's situation and developing innovative solutions. Before the advent of the industrial age, there was a very intimate relationship between the user of a product and its designer. Through the on-going process of mechanization and automation, the distance between the designer and the end user has continued to increase. One goal of current design education is to reconnect the designer with the user. As the graduate program becomes more grounded in research and theory, maintaining a close relationship between the designer and the user will continue to be a challenge. Understanding how users think and examining their patterns of use will come out of this research with users. Achieving this understanding will require new methods and new techniques of study. The objective of this new research is not just to understand the user and their experience better, but to be able to turn this understanding into innovation and better solutions.

The Study

This case study is an examination of the interaction and results achieved by a diverse group of Masters and Doctoral students at the University of Kansas. As part of their program of study, several of the students have been meeting formally and informally since the fall of 2003 under the guidance of their primary instructor, Richard Branham (RB). In the fall of 2004, the group received an influx of new students. This case study focuses on the dynamics of the group after this infusion of new blood. As a case study it explores a 'bounded system', bounded by time and place, involving multiple sources of information (Creswell, 1998). Data collected includes observations, interviews, surveys, audio-visual material, as well as work products, documents, and reports.

--Group Demographics

Over the course of the semester, sixteen individuals have been involved with the group. Fifteen of the individuals are male, and one is female. The age of the individuals ranges from 24 to 51. A breakdown by age is provided in Figure 2.

[Place Figure 2 about here]

About half the group worked professionally before pursuing their current degree. The members of the group come from a variety of backgrounds: psychology, computer science, vocational technical education, engineering, architecture, fine arts, education, and business. The members of the group are also pursuing different degrees as outlined in Figure 3.

[Place Figure 3 about here]

When surveyed, several of the group members commented on how important it was to have a group that was multi-disciplinary.

> *"I like the diversity." (MS, LM)*
>
> *"Opportunity to experience different disciplines…" (KP)*
>
> *"I like that it is very open and multi-disciplinary." (RM)*
>
> *"I like the degree program in the multi-disciplinary aspect…I like the fact that there are people who are in different professions than I am…I feel that this helps me understand other people's point of view." (SP)*

Other institutions have found that engaging students across disciplines allows students from design to benefit from the practice and experience of colleagues that have a richer background in academic study and research (Stickler, 1998). In the group at KU, the doctoral students from education have played this role.

The Results

After the initial meeting at the beginning of the Spring 2005 semester, one of the participants initiated action and created a private group forum using Yahoo Groups. Information about the group is available at: http://groups.yahoo.com/group/interactiondesign/.

Participants were sent e-mails and asked to join the group. All but one participant opted to join the forum; however, several participants have opted out of receiving e-mail messages.

--Messages

Having a forum to critically discuss ideas and viewpoints was important to the group members. Not only have the discussions been stimulating, but they have the helped the group members clarify their own thinking processes.

> *"[The group has] helped me solidify my ideas…as a designer" (SS)*
>
> *"I've developed my ways of thinking through the process." (PP)*
>
> *"I like the fact that we discuss every topic thoroughly and explore all the aspects of them in a critical way." (RM)*
>
> *"I like the stimulation of ideas that has happened this semester." (LM)*
>
> *"I like the digression and discourse. I wish that I could spend more time in that conversation." (MS)*

In a four-month time frame spanning from 1/14/2005 to 4/18/2005, 362 messages were posted to the Yahoo group's forum. The content of the messages was categorized and the results are displayed in Figure 4. Some messages were included in more than one category.

[Place Figure 4 about here]

The forum provided an opportunity for group members to discuss certain topics at length. Not all the group members were comfortable sharing in a face-to-face meeting, and the forum provided an opportunity for some of these individuals to become actively engaged in the debate.

The highest category of messages was 'Social Interaction/Acknowledgement'.

The next highest category was 'Process – Individual Interpretation – Debate/Feedback'. Several individuals presented their ideas on the nature of design and posted them to the forum. These postings were always followed by spirited debate. In many cases, humor and social acknowledgement were used to defuse contentious situations.

The next highest category was 'Group Logistics'.

--Files Uploaded

Members of the group uploaded 49 files to the forum. Additional articles of interest were provided via hard copy in the actual meetings.

Again, the content of the files was categorized and the results are displayed in Figure 5.

[Place Figure 5 about here]

Again, the numbers reflect the keen interest of the group members in the process of design and the importance of being able to provide their own individual interpretation to the process. Many of the files uploaded were standards documents developed by the International Organization for Standardization (ISO). Some of the standards discussed included standards on Quality Management Systems, Human-Centered Design Process, Ergonomics and Usability. Several additional references to books discussed within the group are provided in a separate reference list at the end of this article.

--Face-to-face Interaction

Two of the weekly meetings were videotaped and analyzed for the level of participation by each member. Each individual's face-to-face interaction by percent of the whole was then compared to their level of activity in the forum as measured by number of messages. The results of this interaction are provided in Figure 6.

[Place Figure 6 about here]

The members who have been most engaged in the group process are older and have professional experience. Some individuals participated more in the meetings as compared to the forum (LM) while other participated heavily in the forum but were not active in the group discussions during the face-to-face meetings (SD). One individual was unable to attend most meetings and his involvement was limited mostly to the forum (BP).

In reviewing the biographical surveys that individuals provided, it revealed that some of the younger members acknowledge their passive role in the group and preferred to be observers of the process rather than active participants. Some of the members were inhibited by their English skills or felt like they had little to contribute.

> *"I need to develop my skills in English in order to present my ideas." (PP)*

> *"I feel I don't contribute much but I try to add value to the discussion areas I know." (SS)*

It was observed however, that when some of these younger, less experienced members were involved in sub-committees and were given specific tasks to complete, they became more involved with the group and participated more.

Discussion

Who are we and who do we want to be?

Whether the group is small, or large, a driving question that continues to be asked is 'Who are we?' and more importantly, 'Who do we want to be?'

When the group first started meeting in January 2005, they began with the charter established by the previous group. The earlier group had decided to work together on an ambitious project: to build a web-based repository on the research and application of interaction design. The decision to pursue this effort was discussed for weeks and gradually evolved into a full-fledged project. But progress on the web repository project floundered because of lack of time, lack of resources, and lack of commitment.

During the first weeks the focus of the group discussion was to decide on what the group should be doing and what the group wanted to do.

The important thing to both groups was to be involved in a real-world, authentic project that added value and was more than just another exercise. They wanted to create something that would last beyond just their simple involvement in the group.

> *"Since we have begun meeting again, we have a diverse set of minds and a clear focus on what we want to accomplish. There is a collective enthusiasm about creating something that we can all take ownership of and that is a good thing." (BP)*

Several members of the group came from marketing or business backgrounds and wanted to find some practical application for the group that might even be profitable!! This philosophy of the students reflects efforts in the past to engage students in real-world projects. One approach to accomplishing this is to collaborate with business in a work-based learning environment (Caban, 1998).

At some point, it was suggested to develop and conduct a workshop. A website could be developed to support the participants after they attended the workshop and could serve as a basis or foundation for a larger web repository. It was agreed upon with the group to follow this direction, however, the group still has discussions almost every meeting about the why we are taking this course of action.

What is Design?

A major purpose for the groups has been to provide a place for students to discuss the greater philosophical questions of what is design and to begin to form their own their theories of design. There were many discussions in the online forum about his topic.

> *"Is there a difference between anyone engaged in solving problems or creating things with a purpose and a designer? Are there perhaps two or more forms of the term "design?" Informal Design: problem solving / creating with purpose; Formal Design: a professional discipline involved in" (MF)*

> *"Does the designer's job go beyond the user¹s needs? You have to carefully consider whom you define as a 'user.'" (SD)*

> *"Project management is, in my estimation, the most important aspect of 'design' of any sort…in most instances, a designer--particularly a freelance designer--will end up (whether he/she knows it or not) with the lion's share of the project management burden. I would expect a first-rate PhD program to hammer that notion into students' skulls from Day One. My $0.02" (SD)*

At one point, the earlier group decided to focus their efforts toward Interaction Design. Many long discussions were held trying to define Interaction Design. The current group has gradually gravitated back towards simply focusing on Human-Centered Design. Some of the debate has explored the merits of using the term Human-Centered Design versus User-Centered Design.

Several individuals developed schemas designed to depict the design process. One individual would post or present a diagram and the group would discuss it and add input. Based upon this input, the diagrams evolved and then different individuals would share their own interpretations. Several of these diagrams are presented in Figures 7, 8, 9, and 10.

[Place Figures 7, 8, 9, and 10 about here]

What can we accomplish as a group within a reasonable timeframe?
Making the decision to host a workshop was a major turning point for the group. The web repository project was simply too big and too broad for the group to handle. Deciding to host a workshop has allowed the group to focus on the big topics that they want to cover with their audience and has given the group a chance to apply some of their theoretical studies to a real-world situation.

The workshop was also a small enough project that it was possible to complete it before the end of the semester.

The experience of the long-term members was that it was difficult to maintain the same level of involvement during the summer and during breaks from school.

Another interest in the group has been in developing or expanding the opportunities available at the University of Kansas. Several of the posts in the forum have been about other degree programs (see list below), and how the program at KU could be structured to be more effective. The group was particularly interested in the philosophy behind Stanford's Institute of Design illustrated in Figure 11.

MIT Sloan School of Management
(http://ocw.mit.edu/OcwWeb/Sloan-School-of-Management/)

Columbia Interaction Design Seminar
(http://www1.cs.columbia.edu/~paley/spring03/)

The Institute for Human and Machine Cognition
(http://www.ihmc.us/)

Royal College of Art and Interaction Design
(http://www.rca.ac.uk/pages/research/interaction_design_607.html)

Australasian CRC for Interaction Design Pty Ltd (ACID)
(http://www.interactiondesign.qut.edu.au/)

Stanford Institute of Design
(http://www.stanford.edu/group/dschool/index.html)

[Place Figure 11 about here]

How do accomplish our goals?

--Brainstorming
The group used a variety of brainstorming techniques to generate ideas. One technique used was mind mapping to discuss details about sponsoring a workshop and to determine appropriate or reasonable topics for the workshop. These mind maps are illustrated in Figures 12 and 13.

[Place Figures 12 and 13 about here]

The process of determining topics took several iterations and many discussions and was eventually resolved by delegating the task to a committee.

--Committees
The group was fairly large and at most meetings there were more than 12 people in attendance. At several points throughout the process, it was decided to delegate certain discussions or decisions to a committee. The various committees formed throughout the process are outlined in Figure 14.

[Place Figure 14 about here]

--Use of Technology
The use of technology has played an instrumental role in the functioning of this group. The group is fortunate to have access to a conference room that includes several white boards, an electronic smart board, LCD projector, conference call phone, computers and Internet access. This rich environment has allowed the group to simultaneously view materials from the web, collaboratively work on documents, and to document the results of brainstorming sessions electronically. The creation of an online group and forum has provided a central repository for a calendar, messages, files, and links. Another innovative use of technology was the introduction of 'wikis'. **"**Wiki is a piece of server software that allows users to freely create and edit Web page content using any Web browser. Wiki supports hyperlinks and has a simple text syntax for creating new pages and crosslinks between internal pages on the fly." (Leuf & Cunningham, 2002) Some of our documents were uploaded to a 'wiki' site for collaborative editing, although, the group really did not take full advantage of this feature.

How well did we accomplish our goals?

At the time of publication, April 29, 2005, the bulk of the work was still being done in committees. Our original goal was to present the workshop to an audience in May, 2005. Many of the members will continue to be involved after

the Spring semester ends, but experience has shown that involvement decreases when regular classes are not in session.

The group really struggled with developing personas. They recognized the need to create them, but they were unsure how to begin and what was important to include and not include in the personas.

To determine the effectiveness of the workshop, the System Usability Scale (SUS) Questionnaire was slightly modified to reference Human-Centered Design (HCD) rather than a system (Figure 15). The questionnaire will be presented to workshop attendees at the end of the workshop.

"The System Usability Scale (SUS) is a simple, ten-item scale giving a global view of subjective assessments of usability…SUS was developed as part of the usability engineering program in integrated office systems development at Digital Equipment Co Ltd., Reading, United Kingdom." (Brooke, 2002)

[Place Figure 15 about here]

Future Efforts

Upon reflection, several lessons can be learned from the experience at KU and can be used to further enhance graduate learning programs in design at the university level.

1. Opportunity to work in a multi-disciplinary environment
2. Opportunity to apply design education
3. Opportunity to mix students, faculty, and industry
4. Engage students in real-world, authentic projects
   --keep projects small enough to complete within semester, but challenging
5. Provide active (situated) learning experience
6. Provide a forum for students to explore the philosophical questions about what is design
7. Provide younger, less experienced members opportunities to be involved through work on committees, mentoring with more experienced members, and the assignment of specific tasks to complete
8. Engage students in developing degree programs
9. Apply technology to learning and communication tools

Figures

Impact	Domain
Individual	Emotional/Spiritual
	Psychological
	Physiological/Physical
Group(s)	Social
Culture	Local
	Regional
	Global

Figure 1 - Domain of Influence and Target of Impact

Age Group	Number attending
20-29	7
30-39	3
40-49	5
50-59	1

Figure 2 – Number Attending by Age Group

Degrees being pursued	Number
BFA, Industrial Design	1
MA, Special Studies/Interaction Design or Industrial Design	6
MFA, Industrial Design	3
MBA	1
PhD, Educational Technology	2
None	1
Unknown	2

Figure 3 - Degrees being pursued by participants

Content Type	Message Cnt
Social Interaction/Acknowledgement	109
Process - Individual Interpretation - Debate/Feedback	85
Group Logistics	80
Interesting Articles/Books/Websites	31
File Upload	27
Workshop	17
Interaction Design - Teaching It	15
Links to Websites	15
Process - Individual Interpretation	12

Interaction Design - General	9
Process	8
Social Announcement	6
Interaction Design - Technology	6
Personas	5
Marketing	5
Tools	5
Vision	3
Methods	3
Interaction Design - Strategy/Planning	2
Interaction Design - User Interface	1
Personas - Debate/Feedback	1

Figure 4 - Message Content

Content Type	Group Files Cnt
Process	17
Process - Individual Interpretation	10
Workshop	9
Interesting Articles/Books/Websites	7
Methods	2
Group Logistics	2
Personas	1
Interaction Design - General	1

Figure 5 - File Content

Member	Age Group	Total Talk Time (seconds)	% Talk Time	Number of Messages	% of Messages
MF	40's	1391	24%	100	30%
LM	40's	1209	21%	21	6%
RB	--	1037	18%	6	2%
MS	40's	630	11%	58	18%
DV	20's	465	8%	1	0%
SX	20's	310	5%	0	0%
MM	20's	205	4%	2	1%
SD	40's	167	3%	108	33%
SS	30's	100	2%	0	0%
KP	30's	95	2%	4	1%
AP	50's	85	1%	4	1%
RM	20's	30	1%	2	1%
BP	30's	0	0%	22	7%
DN	20's	0	0%	1	0%
FC	40's	0	0%	1	0%
Total		5724		330	

Figure 6 - Level of Face-to-Face Interaction versus Forum Interaction

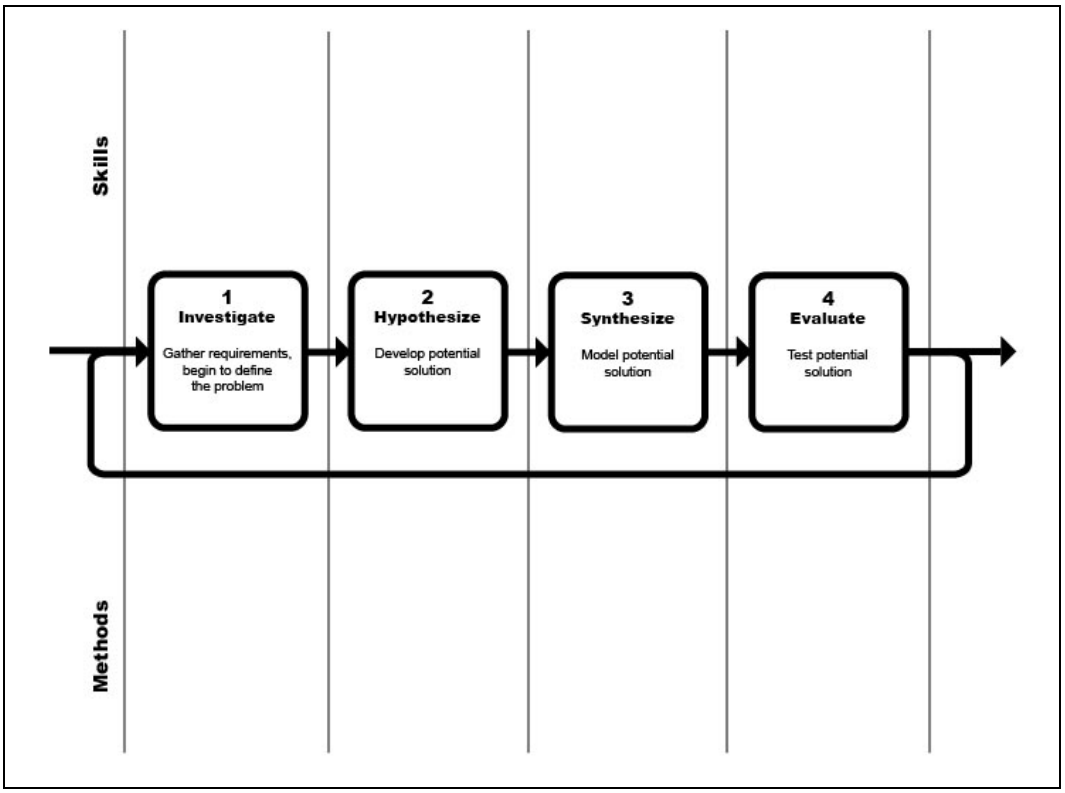

Figure 7 - Basic Process to Cross-Reference with Skills and Methods (MF)

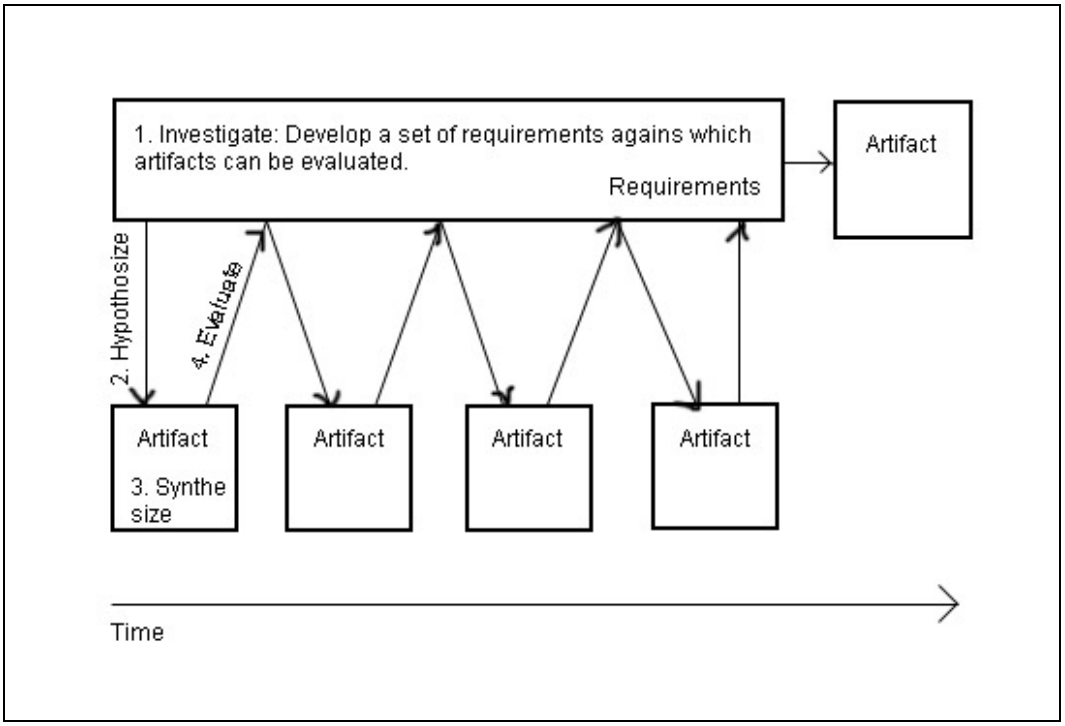

Figure 8 - Deluxe Model (MF)

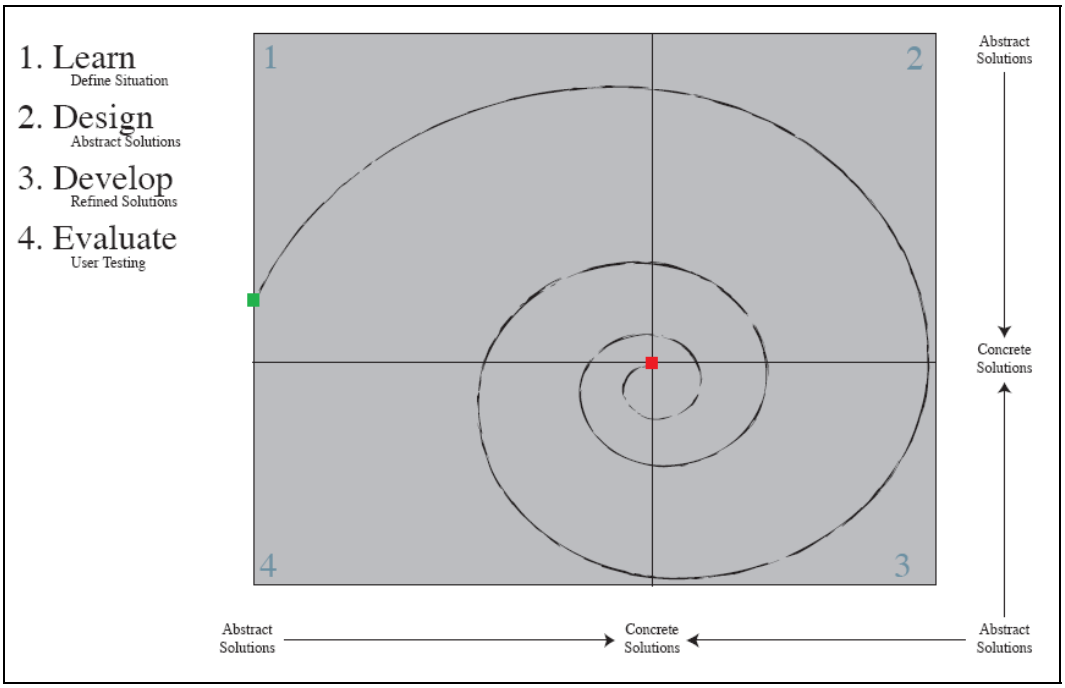

Figure 9 - Design Process (KP)

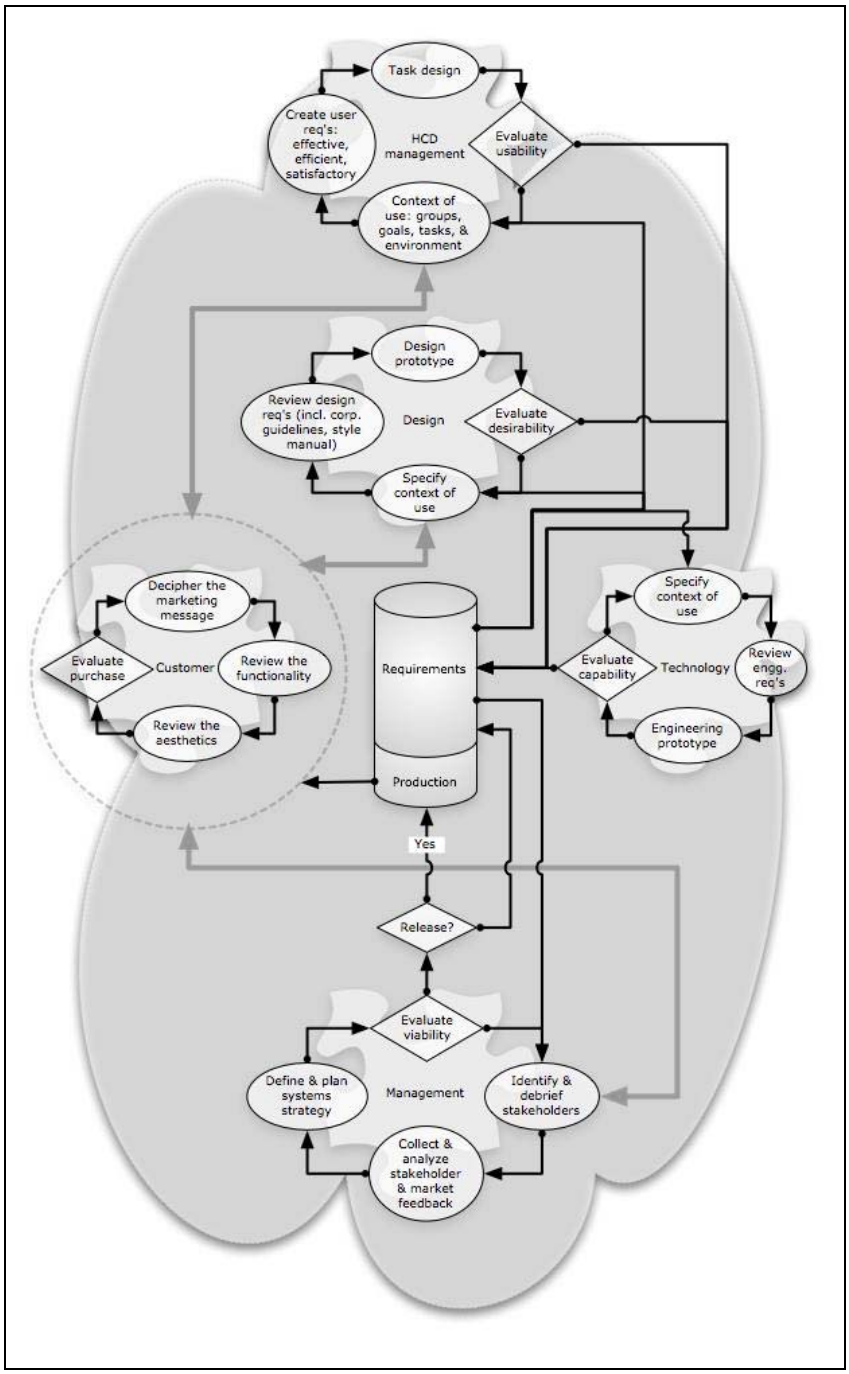

Figure 10 - Design Process based on ISO (SD, AP)

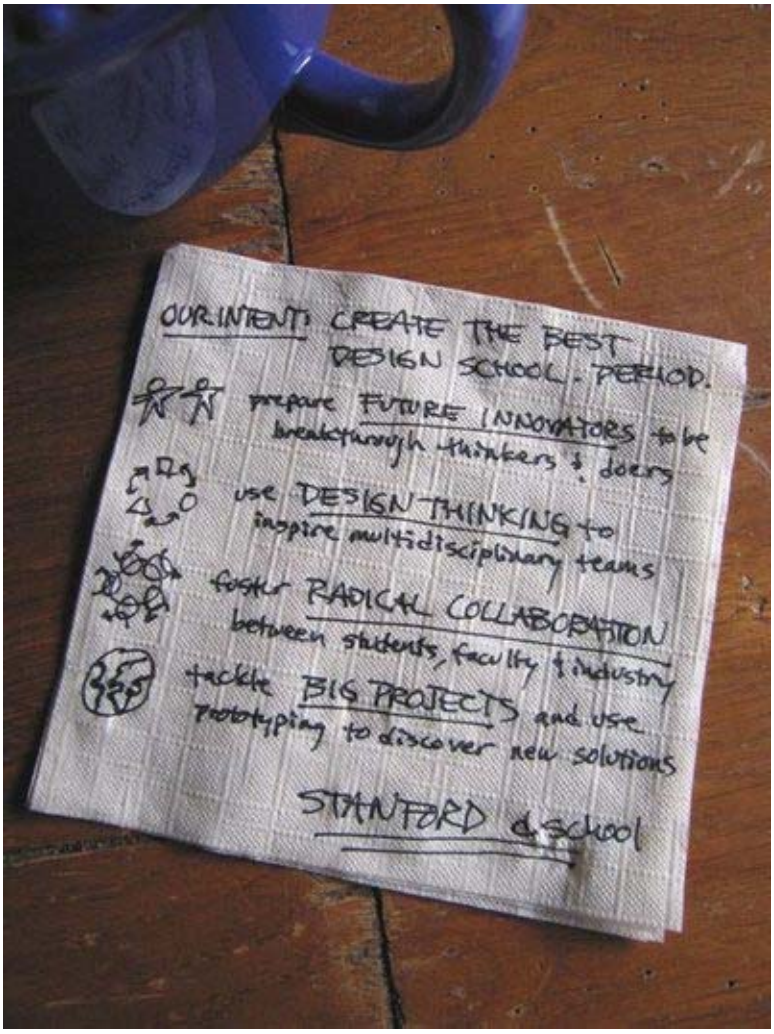

Figure 11 - Manifesto from Stanford's new Institute of Design **(aka the** "d.school"**)**

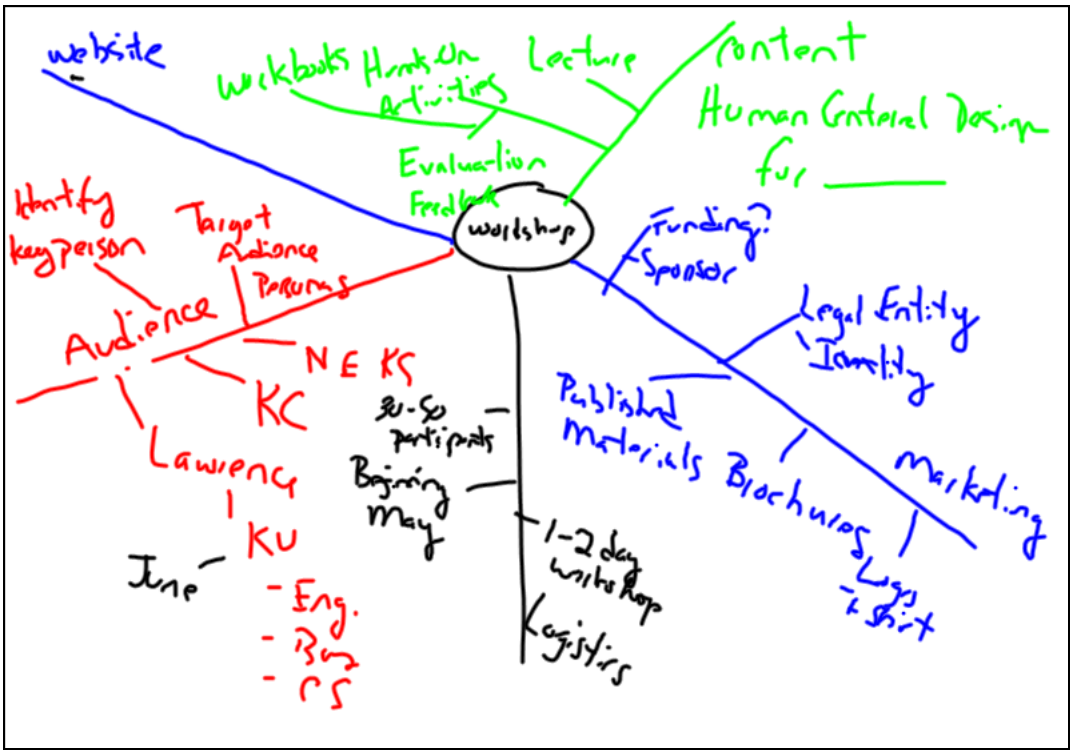

Figure 12 - Mind Map on Structure of Workshop

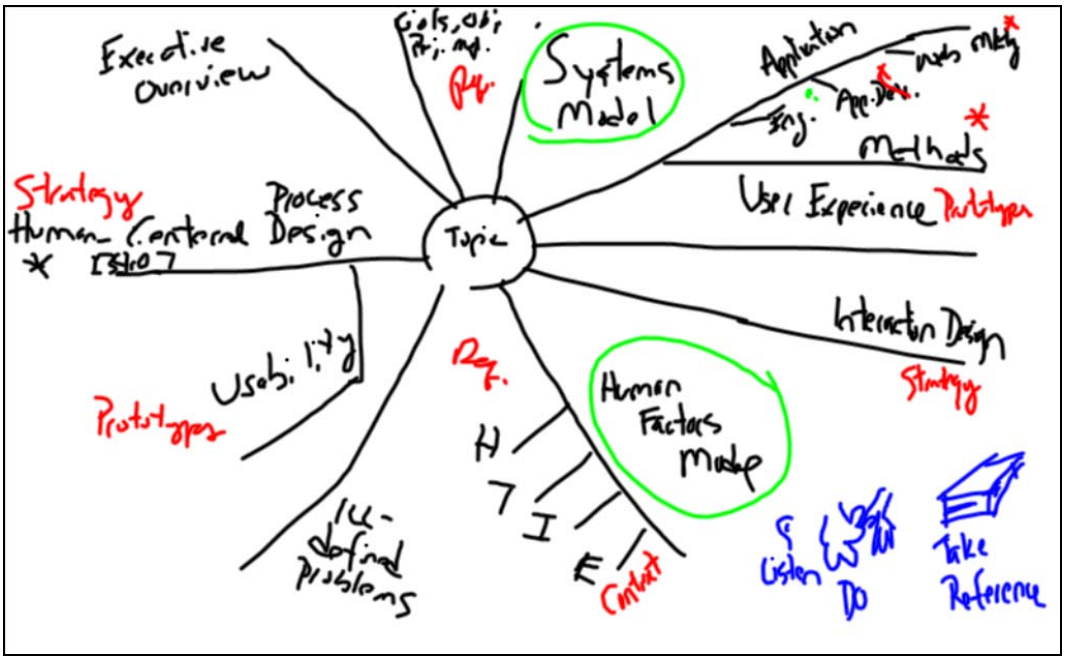

Figure 13 - Mind Map of Potential Workshop Topics

Committee	Function/Purpose
Business	Determine the legal entity required to allow the group to function as a business and collect revenue from workshops.
Personas	Develop personas to help guide

	development of workshops.
Education	Formalize the content of the workshops.
Marketing	Develop a brand (name, image) for the group and for the workshops.

Figure 14 - Committees Formed by Group

System Usability Scale Questionnaire					
	Strongly Disagree				**Strongly Agree**
1. I think I would like to use this HCD frequently.	1	2	3	4	5
2. I found HCD unnecessarily complex.	1	2	3	4	5
3. I thought HCD was easy to use.	1	2	3	4	5
4. I think that I would need the support of a technical person to be able to use HCD.	1	2	3	4	5
5. I found the various functions in HCD were well integrated.	1	2	3	4	5
6. I thought there was too much inconsistency in HCD.	1	2	3	4	5
7. I would imagine that most people would learn to use HCD very quickly.	1	2	3	4	5
8. I found HCD very cumbersome to use.	1	2	3	4	5
9. I felt very confident using HCD.	1	2	3	4	5
10. I need to learn a lot of things before I could get going with HCD.	1	2	3	4	5

Figure 15 - Modified SUS Scale for HCD Workshop Evaluation

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