Week 2: Research Planning
Human-Centered Design
Overview

• Why We Need to Plan & Execute Research
• What is Field Research?
• Tools
  – Anthropology/Ethnography
  – Industrial Design/Design Thinking
• Example: Kohler Mobile Showers
• Guidelines for Research Design
Where to Start?

Starting a business is at its heart a means fulfilling a need or desire
...in other words,

Solving A Problem.

Which begs the question,

What’s the Problem?
Understanding the problem starts with understanding your customer and the customer’s environment. Let’s look at McDonald’s for a minute. Have you ever had a Big Mac?

The classic American Big Mac is a burger with 2 beef patties and a bun in between, with cheese “special sauce”, lettuce, and onions.

Photo: http://genevalunch.com/blog/tag/food-and-drink/page/2/
Understanding Your Customer

- McDonald’s sells fast food in nearly 100 countries.
  - Have you ever been to a McDonald’s in another country (or even another part of the country)?
  - Did you notice any differences? Would you expect any?
Understanding Your Customer

India: McDonald’s adapted its Big Mac to suit the needs of people who don’t eat beef

Greece: The Greek Mac is served on pita bread instead of a bun
Primary & Secondary Research

• To find out what customer needs, desires, and habits are, you need to do research
• Primary Research is gathered for your specific purposes
• Secondary Research is originally done for another purpose
• What are some benefits and drawbacks of each type of research?
Field Research

- Field research is conducted outside of the office or lab, in places where potential users live and work.
- US, India, and Mexico students will develop research plans together and the students in India and Mexico students will carry out the research.
  - Think about the biases they may have and how you might try to mitigate them.
- One enormous benefit to designing your own research plan is that researchers will ask the questions you want, about your specific product.
Our Toolkit

We will borrow techniques from other disciplines, mainly

- Anthropology/Ethnography
- Industrial Design
ANTHROPOLOGY & ETHNOGRAPHY
“Anthropology is the study of humankind over the entire world and throughout time. Anthropologists study existing cultures and human behavior (cultural anthropology), traditions (folklore), prehistoric cultures and lifeways (archaeology), the biological makeup and evolution of humans (physical anthropology), and the origin and nature of language (linguistics).”
Ethnography

• “Ethnography” is sometimes used as a synonym for cultural anthropology
• Also describes a technique used by anthropologists and other social scientists

“Ethnographers…often live among the people they are studying, or at least spend a considerable amount of time with them. While there, ethnographers engage in "participant observation", which means that they participate as much as possible in local daily life (everything from important ceremonies and rituals to ordinary things like meal preparation and consumption) while also carefully observing everything they can about it.”

Source: University of Pennsylvania Anthropology Dept. Website http://www.sas.upenn.edu/anthro/whatsethnomography
“Through this, ethnographers seek to gain what is called an "emic" perspective, or the "native's point(s) of view" without imposing their own conceptual frameworks...”

Source: University of Pennsylvania Anthropology Dept. Website http://www.sas.upenn.edu/anthro/anthro/whatisethnography
“Through the participant observation method, ethnographers record detailed field notes, conduct interviews based on open-ended questions, and gather whatever site documents might be available in the setting as data.”

Source: University of Pennsylvania Anthropology Dept. Website http://www.sas.upenn.edu/anthro/anthro/whatisethnography

Photo: http://www.jefferybentley.com/
Ethnographic Techniques

- We will use a “lite” version of ethnography
  - Shorter time frame
  - More specific research aims
- We still want to understand the user’s point of view
- What is it like to walk in that person’s shoes?
- Understanding also requires background research into the general environment: geography, politics, economics, pop culture…you can do more of this remotely
Ethnographic Techniques

• Different from focus groups
  – Ethnography generally takes place in the subject’s “natural” environment (i.e., home), rather than the “artificial” environment of a lab or office; the idea is that the subject is more comfortable and responses will be more honest or true
  – Ethnography generally takes a broader view, delving into many aspects of the subject’s life, whereas focus groups tend to center more on a particular area

• We want to see what people actually do in real situations, not just ask them what they think or remember
  – People may be intentionally dishonest or just unintentionally wrong about predictions or memories
INDUSTRIAL DESIGN
Issues Today?

• Access to user research and “incomplete information”
• Coalescing the ambiguous information you do have into actionable design criteria
• Creating prototypes
• Creating business models
• Others?
Issues Today?

• Access to user research data ‘Incomplete data’
• Coalescing the ambiguous information you do have into actionable design criteria
• Creating prototypes

• Creating business models
Role of Industrial Design

• Sometimes called “design thinking”
• Usually used to create a new product, but we can use concepts to learn about customer needs and create ways to deliver our existing product in a way that fits needs
What is “Industrial Design?”

Making the intangible, tangible
What is Industrial Design?

Translating intangible user needs into a tangible solution.
What is Industrial Design?

Often the bridge / translator / referee between business and technical fields
What is Industrial Design?

- Much overlap, often the cause the “territoriality” friction

- ID’s core competency is in the creation of design criteria and product concepts
Follow thy user
Everything else will follow
AN EXAMPLE FROM SC JOHNSON IN KENYA

Slides Courtesy of Jeremy Knopow
Project Beginnings

• SC Johnson sent a 6-member team to the slums of Nairobi, Kenya in 2005 to look for business opportunities
  – No preconceived ideas of what type of business
  – Part of an corporate innovation initiative to develop sustainable businesses serving the Bottom of the Pyramid (BOP), or the world’s poorest communities, called the BoP Protocol (BoPP)

• Research led to co-creation of Community Cleaning Services, a group effort between youth SC Johnson and several youth self-help groups in the slums

http://www.johnson.cornell.edu/sge/research/bop_kenya.html
RD&E / BoP Collaboration: Kenya
CURRENT BOPP KENYA BUSINESS: Community Cleaning Service

- Franchise type model, with independent operators who **live in the areas they work**

- CCS central provides business and marketing support, as well as cleaning supplies and training

- Currently 12 CCS teams service ~400 toilets and bathrooms per week

- Sites are either shared residential or public pay per use

- Charge is about $0.50 USD / toilet or bath

- CCS teams currently earn more than **2x Kenyan minimum wage**
CURRENT BOPP KENYA BUSINESS: Community Impact
SCJ RD&E GETTING INVOLVED

- Jeremy Knopow requested opportunity to participate in BoPP in Oct. 2008

- Initial goal was simply to determine if there was any potential synergy between Research, Development & Engineering (RD&E) and BoP

- 3 weeks were spent in Kenya immersed in the BoP project in Feb. 2009

- 1st week was intended as cultural acclimation and BoPP background, while 2nd – 3rd weeks were to be spent fully immersed living in the slums and working on the BoPP cleaning teams

- **Visit evolved from just exploratory research into process and product development as opportunities presented themselves**

- J.Knopow has been involved ever since at about 15-20% time, recent trip back in Feb. 2010
The Slums of Nairobi, Kenya...
After just the first few days on the 1st trip it became clear that there was abundant opportunity for mutual benefit between RD&E and BoPP

We agreed to expand the goals of the visit to specifically investigate:

1. Improving the efficiency of the current BoP teams’ cleaning process

2. Other SCJ offerings that could aid in expanding the BoP business

3. Potential “trickle up,” or “trickle sideways,” project ideas that could flow from the BoP into SCJ projects
RD&E METHODOLOGY AND TOOLS

• Working within the BoPP project called for the independent application of an extremely broad set of R&D skills, particularly:
  ◦ Immersive ethnography
  ◦ Hands-on task analysis
  ◦ 1st person consumer research
  ◦ Iterative prototyping
  ◦ Product engineering
  ◦ Consumer product testing
  ◦ Microbiology
  ◦ Chemistry
  ◦ Material science
  ◦ Claims development

• Exercising these skills in collaboration with the local BoPP team members proved to be an invaluable learning experience for both sides

(optional video: “me cleaning”)
Hand splashing application of soapy wash water

◦ Lots of water being wasted in splashing motion and soap “running away” before it could be used
◦ Splashing action may be carry over from process commonly used in the area for bathing with a bucket

Order in which the surfaces were cleaned

◦ Scrubbing floors last caused re-cleaning of walls

Dispensing bottles for Toilet Duck and soap

◦ Near impossible to refill TD bottles from 20L bulk containers, causing teams to use any wide-mouthed container instead
◦ Applying TD with random containers lacked “under rim reach” and caused much TD to go down the toilet (literally)
◦ Similar random containers used for soap, lacking feedback or control over amount used

TASK ANALYSIS OF CURRENT CLEANING METHOD: Key Opportunity Areas

(optional video: “splashing-water-door”)
Reducing **water** usage proved to be a key target, as it impacted multiple facets of the business:

- **Time: # sites/day** – Current cleaning methods often required multiple trips to a distant water source, limiting the number of sites that can be cleaned in a day.

- **Cost** - Water had to be purchased for use at most sites.

- **Environment** – Water shortages are an everyday occurrence in Nairobi.
TASK ANALYSIS OF CURRENT CLEANING METHOD: Solutions

- Wasting of water and soap due to splashing liquid
  - Foam method developed that uses 1/2 of the water and soap does not “run away”
- Re-cleaning bottom portion of the walls
  - Cleaning routine modified to scrub the floors before the walls, eliminating re-cleaning
- Wasting of Toilet Duck and soap due to dispensers
  - TD bottle developed from local materials that is easier to refill, has a curved neck for reach, and translucency plus calibrated markings provide user feedback on usage
  - Cap of new bottles fit thread of 20L bulk containers to double as decanting spout, preventing spillage and material waste
  - Similar soap bottle developed, easy to refill and provides user feedback on usage

(optional video: “new-foam-method”)
<table>
<thead>
<tr>
<th></th>
<th>Total Water (L)</th>
<th>Soap (ml)</th>
<th>TD (ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Old</td>
<td>New</td>
<td>∆</td>
</tr>
<tr>
<td>TOTAL -29 toilets</td>
<td>400</td>
<td>173</td>
<td>-227</td>
</tr>
<tr>
<td>Avg / toilet</td>
<td>14</td>
<td>6</td>
<td>-8</td>
</tr>
<tr>
<td>% Reduction</td>
<td>57%</td>
<td>56%</td>
<td>68%</td>
</tr>
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</table>

- These cost reductions translate into a potential CCS team revenue increase per toilet of approximately 60%

- Over the 4 weeks since the visit, teams have been consistently reporting cleaning 1.5x-2x more toilets per day, due to reduced water trips

- At 1.5x more toilets per day, the teams’ daily profit increases 136%
  - The water reduction alone accounts for 94% of the increase
## TASK ANALYSIS OF CLEANING METHOD: Summary

<table>
<thead>
<tr>
<th></th>
<th>OLD</th>
<th>NEW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soap Application</td>
<td><img src="old_soap.png" alt="Image" /></td>
<td><img src="new_soap.png" alt="Image" /></td>
</tr>
<tr>
<td>Soap Dispenser</td>
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<td>TD Transfer</td>
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<td><img src="new_td_transfer.png" alt="Image" /></td>
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<tr>
<td>Water Usage</td>
<td>14ml</td>
<td>6ml</td>
</tr>
<tr>
<td>Soap Usage</td>
<td>47ml</td>
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<tr>
<td>TD Usage</td>
<td>41ml</td>
<td>13ml</td>
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<tr>
<td>Toilets per Day</td>
<td>18</td>
<td>27</td>
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<tr>
<td>Daily Team Profit</td>
<td>594 Ksh</td>
<td>1404 Ksh</td>
</tr>
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</table>
TASK ANALYSIS OF CURRENT CLEANING METHOD: Other Trials

Implemented

- Non-scratch scraper developed for removing previously impenetrable “crust” (adopted and implemented to be additional service)

- Section of semi-rigid hose sourced to aid unclogging in bent piping, vs. current using straight stick

Other process improvement experiments

- Waxing walls with paste wax to aid cleaning

- Rinsing with bleach solution

- Using pull-top water bottles for dispensing

- Various decanting methods for filling TD bottles from 20L bulk containers
Expanded SCJ- Enabled Service Offerings: Opportunities

Client and team research identified potential new service needs:

- Odor Control
- Insect Control
- Wood dusting/polishing
- Carpet care
- Drain unclogging
- Septic tank / pit digestion
- Soft surface
Expanded SCJ- Enabled Service Offerings: Odor Control

- Odor control was #1 client request

- Solution needs to be effective, low cost, last 1-2 weeks, and theft proof

- Experiments included Glade, drop-ins, bleach, scented wax, charcoal ash from cooking stoves, and Scrubbing Bubbles toilet gel

- Ash proved viable for controlling odor, but increasing pump-out frequency and business model could prove difficult

- SB Gel proved most promising for odor control and presented a viable business opportunity
Expanded SCJ- Enabled Service Offerings: Odor Control

- SB gel tested positively at 12 sites, providing effective odor control for 1wk+, even in full latrines

- No theft or product disturbance

- Client feedback suggested willingness to pay up to 2x current cleaning fee if odor control was included

- Initial 12 test clients have begun asking the team members for the service again

- Larger test of 144 sites underway

- Potential alternative in new Toilet Duck stick-on strips – test of 120 sites underway

- Both SB Gel and TD Strips could be provided in bulk format
Update: Beechnut gel implemented

- Developed pastry bag method of bulk dispensing
- Utilizing excess material from manufacturing line testing shipped in bulk barrels
  - Cheaper to send to Kenya than to dispose of
**Update from Recent In-Field Work – Feb 2010**

*Follow up items from last field work…*

- Graduated dispensing bottles developed on last trip were still being used successfully by the CCS teams to reduce waste and increase profitability.

- SB Action Gel is fully rolled out to the CCS teams and integrated as a staple of their cleaning service, allowing them to charge 50% more per service.

- “Foam Method” still being utilized by teams, particularly during periods of drought, realizing significant water savings.
Update: Conversion from local soap to MM WIN

- Lower cost for teams
- Less water usage due to spray action
- Improved efficacy and health benefit
- SCJ brand development
Health and Sanitation Impact

- Initiated “claims process” for measuring health and sanitation impact of cleaning service - May prove key to increased funding from other partners

- 10 sites sampled for bacteria count before and after CCS cleaning service

- Samples transported back to SCJ for analysis

- Preliminary results show ~75% reduction in bacteria count after cleaning - However, count still 3x higher than typical US bathroom

- Identification of bacteria still ongoing

- Larger scale test plans in progress utilizing local Nairobi lab
Update from Recent In-Field Work – Feb 2010

**New work...**

- Proved out use of SCJ MM Kitchen formula as substitute for local generic general purpose cleaner (GPC) currently in use
  - Material cost is 2-3x less than current GPC
  - Water usage reduced by approximately 1/3, due to less water required for rinsing
  - Improved efficacy, antibacterial properties

- Proved out use of electronic “germ meter” as means of quantifying cleaning efficacy for improving quality control, client satisfaction, and qualifying for health related external funding

- Developed instruction manual and posters to standardize team training and performance, as well as enhancing clients’ professional perception of teams
Update from Recent In-Field Work – Feb 2010

**BoP Cleaning Impact**
Typical “Germ Level” Comparisons

<table>
<thead>
<tr>
<th>“Germ Level” (RLU x 1000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BoP Bathroom BEFORE cleaning</td>
</tr>
<tr>
<td>BoP Bathroom AFTER cleaning</td>
</tr>
<tr>
<td>Modern public bathroom routinely cleaned</td>
</tr>
<tr>
<td>Computer mouse</td>
</tr>
<tr>
<td>Cell phone</td>
</tr>
</tbody>
</table>

- BoP Cleaning Impact: 60
- Modern Public Bathroom: 1
- Computer Mouse: 60
- Cell Phone: 60
Trickle Up / Sideways New Product Ideas

• “Trickle Up” process proving to be cost effective and innovative source of NPD across many industries
  - Unique environment breeds unique ideas

• Potential new SCJ business ideas from BoP experience:
  - Low cost, packageless CAF built on existing SB Gel or TD Strips
  - Low cost, packageless Insect Repellent built on existing SB Gel or TD Strips
  - Septic tank or pit latrine digester for decreasing frequency of expensive pump outs
  - Ready market for surplus Pledge Duster Plus pumps
  - Ready market for low cost concentrates

• Demonstrated significant mutual benefit of RD&E collaborating with BoP

• Follow up on implemented process improvements indicates that potential daily team profit increase of more than 130% is real

• Reducing water consumption by more than ½ with foam cleaning method was key enabler to profit increase

• Identified and proved feasibility of expanded odor control service with existing SCJ products

• Developed methodology for testing health and sanitation benefit, enabling expanded external funding

• Educated local teams in product development skills

• Fantastic personal and professional development experience

- Continue to support the Kenya BoP progress, as resources allow
- Explore potential “trickle up” projects as warranted
- Investigate other ongoing BoP initiatives for potential RD&E collaboration
Mambo’s Latest Work....
DESIGNING A RESEARCH PLAN
Key Points to Remember

• Follow the User

• Go from general to specific, abstract to concrete
  – When exploring needs, start first with questions about family and home life, and later hone in on specifics of food preparation and consumption
  – When assessing the suitability of your solution, begin with a general concept of “something that solves your problem” to “a grinder for peanuts and grain” to “this particular grinder”

• Avoid asking leading questions
  – You don’t want to go into it with an answer in mind already
Key Points to Remember

• Try to maintain a “beginner’s mind.”
  – Even if you have been to a place a hundred times, try to see the place as if you have never been there.
  – Think about your own biases and how these might affect your observations

• Emphasize that you want their honest opinions
  – Encourage them to tell you what they don’t like or would change, because that information helps you
  – Let them know they can’t offend you by anything they tell you
If You Can’t Go into the Field…

• …then you have to get creative
• Create the environment where you are and try to live in their shoes as much as possible
• Find local, *local* experts – Immigrants, NGO’s, cultural groups, visiting students, anyone who has as close to first hand experience as possible
• Create virtual prototypes – describe the experience on paper, storyboard, video, anything to test the experience with the user that is easily sent
• Recruit the users as your researchers – send cameras, diaries, etc.
• User adaptable prototypes – allow the users to create what they want (more for new product design but can work for a way of selling)
Whom to Interview?

- Potential customers
- Potential partners
  - Employees, suppliers, etc.
- Users or sellers of competing products or services
- Who else?
Your Research Plan Should Include:

• **Whom to interview**
  – Specific demographic info, if known
  – Where (rural, urban, specific town)
  – Interview location (where product will be used)

• **Interview Guide**
  – Goal of session, Research Objective
  – Warm-up Period; making interviewees comfortable
  – Interview questions, including time guides

• **Photo/video guidelines**
  – Video is highly recommended
  – Should show preparation and clean-up before and after the activity you are observing
Participant Permission

- Always get the participant’s permission before interviewing or taking photos, video, or audio
- Each school’s Internal Review Board has guidelines for human research subject participation