Elicitation of Unstated Needs
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Software Solutions Conference 2015
November 16–18, 2015
Agenda

- KJ Method Overview
- KJ Interviewing Techniques
- KJ Affinitization Technique
- Kano Analysis
Purpose

Provide an overview of the KJ method and Kano analysis and describe the SEI’s approach for using these techniques in a virtual (non face-to-face), distributed setting.

This overview is an adaptation of a full-day training session.

For more information about KJ+ and to download the tutorial, see: https://www.sei.cmu.edu/measurement/research/eliciting-requirements/
Overview of SEI Approach

Step 1: Evaluate existing knowledge of stated needs and requirements

Step 2: Design the open-ended, probing questions to be used in KJ interviews

Step 3: Conduct KJ interviews collecting all possible context information

Step 4: Analyze raw output of interviews to form context need / activity statements

Step 5: Conduct the KJ Workshop including specialized affinity exercise

Step 6: Identify Unstated Needs and subsequent Innovative Requirements

Step 7: Conduct Kano analysis to determine must-be’s vs. satisfiers vs. delighters

Step 8: Use AHP weighting and QFD matrix to determine quality and performance measures of delighters
Traditional Requirements Elicitation Approaches

- Interviews of customers/users to elicit problems and usage needs
- Inventory of problem reporting systems harboring customer complaints
- Solicitation of specification from customers/users to build a system/product/service specification
- Specification developed by marketing and/or engineering that reflects their thinking on what the customer/user requirements are

Normally, a specification-driven process!
Our SEI Approach

Structured interviews of customers and users with subtle modifications to existing interview techniques

KJ workshops to develop themes and innovative observations within and between themes

Kano analysis to confirm requirements as “delighters” vs. “satisfiers” vs. “must-be’s”

Future use of semi-automated, state-of-the-art text analysis tools and collaborative methods to scale up the above methods for distributed geographic participation by many more people.
KJ – Origins and Applications

Kawakita Jiro (KJ), a Japanese anthropologist, developed a systematic way to find messages in complex qualitative data.

A KJ can be helpful when

- Issues are complex
  - Lots of information available, but many potential interpretations

- Team would benefit by learning together
  - Based on facts
  - Developing common understanding and focus

- Communication and reuse of the information is important
  - KJ is a powerful way to store and transmit data
KJ Interviewing

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Step 8: Use AHP weighting and QFD matrix to determine quality and performance measures of delighters
Selected customers/users are interviewed either individually or in group settings.
Discussions center initially on areas of dissatisfaction.
Interviewing questions and discussion then migrate to solutions that might help.
Both interviewers and customers/users provide ideas for improvement.
Discussion may proceed into details of design and implementation.
Side benefits of these interviews include the following:

1. Interviewers are able to test out their own solution ideas.
2. Customers/users are able to put their recommended solutions on the table.
3. Customers/users feel better after “venting” about their dissatisfaction.
KJ Interviewing Approach

Selected customers/users are interviewed either individually or in group settings. Questions and discussion focus on two extremes: very dissatisfied or very happy.

Additional open-ended, probing questions are used to collect maximum context information surrounding the extremely negative and positive experiences.

It is impossible to know in advance which information will prove actionable until we’ve identified information from all interviews. Therefore it is important in each interview to carefully probe the context of an experience to collect sufficient information by which relevant and reasonable themes of experience can later be constructed.

Copious note-taking of the context information is mandatory in these interviews.

The interviews absolutely do not touch on the solution space.

This is a challenging approach to interviewing customers/users.

To the untrained observer, the interview may seem to be a mere “complaint” exercise!
# Approaches to Interview Questions

Three generic avenues of discussion may be used to start conversations, then probe and follow intuition to learn in real time.

<table>
<thead>
<tr>
<th>Experience</th>
<th>Current Practice</th>
<th>Future Trends</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gaps in past performance often have clues about future value.</td>
<td>How they “do” things can reveal compensatory behavior, waste, etc. – also sources of future potential value.</td>
<td>Where they see things going may hold clues about future value, and tips about robust design or “future-proofing” a solution.</td>
</tr>
<tr>
<td>“Why was this a problem ...?”</td>
<td>“How do you ...?”</td>
<td>“Looking ahead...?”</td>
</tr>
</tbody>
</table>
Gathering Better Data
Sharpening Interview and Discussion Skills

A surface dialogue reveals

- Stated needs and facts
  - Complaints
  - Problems
  - Valued Features
  - Constraints

Refined data gathering and probing can reveal...

- What’s it like in the environment? (context data)
  - User-Scenarios
  - Observations
  - Process Maps

- Underlying functionality (needs data)
  - “What does that do for you?”
  - “How and why is it important?”
# Understanding Context and Needs Data

<table>
<thead>
<tr>
<th>Needs Data</th>
<th>Context Data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Definition</strong></td>
<td><strong>Examples</strong></td>
</tr>
<tr>
<td>Statements about what is needed (solution free)</td>
<td>“We need to get materials in and finished goods out of our warehouse much more quickly than we do now.”</td>
</tr>
<tr>
<td></td>
<td>“There seems to be a lot of turnover in the shipping department, which means we’re constantly training new people.”</td>
</tr>
<tr>
<td></td>
<td>“We need to better monitor contract compliance.”</td>
</tr>
<tr>
<td></td>
<td>“Members will increasingly contract directly with medical groups.”</td>
</tr>
<tr>
<td></td>
<td>“We need to get data into the system...then out to the right people faster and more accurately.”</td>
</tr>
<tr>
<td></td>
<td>“Our biggest challenge is overly complex HMO contracts.”</td>
</tr>
<tr>
<td><strong>How it is helpful</strong></td>
<td></td>
</tr>
<tr>
<td>Specifies functionality that would be valuable</td>
<td>Provides clues and facts about latent requirements and operating conditions</td>
</tr>
<tr>
<td><strong>How we use it</strong></td>
<td></td>
</tr>
<tr>
<td>Capture must-be’s and satisfiers</td>
<td>Identify delighters; inform robust design</td>
</tr>
</tbody>
</table>

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November 18, 2015
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Interview: an Example - 1

B: Can you tell me about your experiences about using a laptop at home.
MB: I’ve had horrible experiences using my laptop at home.
B: Can you elaborate on why this was such a horrible situation.
MB: I always worry that something is going to happen to it and I will have to replace my laptop.
B: I need you to elaborate even more. Please describe some situations at home where use of your laptop was stressful or frustrating.
MB: I spend most of my time in the kitchen and so I often use my laptop in the kitchen. I use it first thing to check my email, I keep all of my recipes on my laptop and use it while I’m cooking but I often get stressed out that someone either me or my kids are going to spill something on it. It seems like I’m always using it for something.
Interview: an Example - 2

B: Can you elaborate a little more about frustration in using your laptop to store your recipes?

MB: I started to do this after I was visiting a friend, we were having coffee and she was fixing a quiche. I noticed that she kept looking at her laptop. I realized that she was reading the recipe when I saw her looking over. I asked her to send it to me and then I started to keep a file on my computer with recipes. I often get recipes from friends and on the Internet so I LOVE that it is so very easy to store these recipes. However, initially I was keeping them in an unorganized folder and it sometimes took me a long time to find the recipe I needed.

B: Tell me more about your actual frustration.

MB: I would get very frustrated because my recipe box has the various tabs that help me to organize my recipes. Once I started to name the recipes with how I refer to them, I just use the “sort by name” feature and I don’t have the problem anymore. My biggest complaint about having recipes on my computer is that I have a window in my kitchen above my sink and my stove is near there. I’ve found that at different times of day, the glare from the window makes the screen hard to read so depending if I’m in a rush, I print out the recipes. I hate doing this because I am concerned about the environment and I have enough clutter. I don’t need another piece of paper lying around the house to be thrown away.
Gathering Better Data
Probing

Language *as we find it* often is the least usable – it may contain…

<table>
<thead>
<tr>
<th>Emotion</th>
<th>Judgment</th>
<th>Inference</th>
<th>Unclear</th>
</tr>
</thead>
<tbody>
<tr>
<td>“I hate the keyboard mouse.”</td>
<td>“This thing stinks when relying on battery power.”</td>
<td>“I need to have my system restore disk set with me on the road.”</td>
<td>“We have a lot of new people that need to come up to speed on laptops soon.”</td>
</tr>
</tbody>
</table>

**Probing**

“Can you give me an example?”
“How did that happen?”
“Why do you say that?”

Language *as we need it*, scrubbed to “report language” – just the facts
Example Generic KJ Interview Questions

1. What were some of your most negative experiences in the past regarding…?
2. What were some of your most positive experiences in the past regarding…?
3. What do you wish you could also do when performing…?
4. Who else would you like to be able to interact with when performing…?
5. How do you feel when something specific such as … occurs?
6. How do others around you feel about…?
7. How could you be more effective? productive? efficient?
8. In what ways would you be happier or more fulfilled in performing…?
9. What increases your stress or frustration in performing…?
10. When and where do you use ....?

(All of these questions would be followed by probing questions of context surrounding the experience! Alternatively, keep asking why?)
KJ Affinitization

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WHAT HAS BEEN PREVENTING US FROM SERVING THE CHANGING NEEDS OF BUSINESS CUSTOMERS?

**Theme Question**
Pivotal – everything else on the KJ is a full-sentence, factual answer to this question.

**Facts** (Black)
traceable to reality (not “ideas”)

**Groups**
whose story (not keywords) unites the members

**Titles** (red, blue)
that precisely abstract the story that unites their group
Now You Try It -- Group two or more of these…

WHAT SCENES AND IMAGES DESCRIBE THE RECENT SUMMER VACATION?

- Up at 5 AM – digging worms
- Checking my email at work
- Quiet time – Reading on the front porch
- On the computer games with the kids
- Out in the boat together - fishing
- All of us around the campfire – telling stories and singing
- Snoozing in the hammock
- Chopping Firewood
TV at Bedtime Exercise

Watching TV at night helps me go to sleep.

I usually fall asleep with the TV still on.

I get stressed out when I must keep a checklist of things to do before falling asleep.

I find myself easily distracted.

My electricity bill is too high! I need to cut down.
TV at Bedtime Exercise

Watching TV at night helps me go to sleep.

Theme of using TV as soporific

I get stressed out when I must keep a checklist of things to do before falling asleep.

I usually fall asleep with the TV still on.

I find myself easily distracted.

My electricity bill is too high! I need to cut down.
TV at Bedtime Exercise

Consider offering a sensor that triggers TV shutoff when the reclining viewer has not left the bed for two hours.

- Watching TV at night helps me fall asleep.
- I usually fall asleep with the TV still on.
- I get stressed out when I must keep a checklist of things to do before falling asleep.
- And myself easily distracted.
- My electricity bill is too high! I need to cut down.
### Example of Traditional Affinity Grouping (Hotel)

<table>
<thead>
<tr>
<th>ID#</th>
<th>Traditional Interviewing Statement</th>
<th>Checkin / Checkout Affinity</th>
<th>Room Quality Affinity</th>
<th>Room Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Clean Room</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Reliable Room Service Delivery</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>3</td>
<td>No-Hassle Check-In/Out</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Friendly Staff</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>5</td>
<td>Room Service Food Fresh &amp; Hot</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Don't Lose Reservation</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>7</td>
<td>Room Service Available</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>8</td>
<td>Nice Towels</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>New Bathroom</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>10</td>
<td>Good Room Service Selection</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>11</td>
<td>Mini-Refrigerator in Room</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Attractive Furnishings</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Big TV</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>14</td>
<td>Express Checkout</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>15</td>
<td>Quiet Heater/Air Conditioning</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>16</td>
<td>Non-Smoking Room Available</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

Taken from affinity website - [https://www.moresteam.com/toolbox/affinity-diagram.cfm](https://www.moresteam.com/toolbox/affinity-diagram.cfm)
## Traditional Responses with Added KJ Contextual Data

<table>
<thead>
<tr>
<th>ID#</th>
<th>Traditional Interviewing Statement with Added KJ Context from Probing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Prefer a Clean Room <em>with a fresh smell to give my hotel stay a pleasant start</em></td>
</tr>
<tr>
<td>2</td>
<td>Expect Reliable Room Service Delivery <em>so I don’t have to keep calling on status</em></td>
</tr>
<tr>
<td>3</td>
<td>No-Hassle Check-In/Out <em>helps me avoid tracking a lot of detail during a business trip</em></td>
</tr>
<tr>
<td>4</td>
<td>Friendly Staff <em>pick up my spirits when I am tired on a business trip</em></td>
</tr>
<tr>
<td>5</td>
<td>If my Room Service Food <em>is not</em> Fresh &amp; Hot, <em>I have to spend time finding a local restaurant</em></td>
</tr>
<tr>
<td>6</td>
<td>Don’t Lose Reservation <em>is a message I don’t want to hear because I do not have access to my travel agent</em></td>
</tr>
<tr>
<td>7</td>
<td><em>I like it when</em> Room Service <em>is Available because I can avoid worrying about logistics</em></td>
</tr>
<tr>
<td>8</td>
<td>Nice Towels <em>put me in a good mood when I have to get up early in the morning</em></td>
</tr>
<tr>
<td>9</td>
<td>New Bathroom <em>gives me a clean feeling and adds energy to my day</em></td>
</tr>
<tr>
<td>10</td>
<td>Good Room Service Selection <em>keeps my stress level down and reduces anxiety about my diet</em></td>
</tr>
<tr>
<td>11</td>
<td>Mini-Refrigerator in Room <em>gives me choices as I decide about food and snacks while working in my room</em></td>
</tr>
<tr>
<td>12</td>
<td>Attractive Furnishings <em>put me in an energetic mood, enabling me to get more work done in my room</em></td>
</tr>
<tr>
<td>13</td>
<td>Big TV <em>helps me see hotel area traffic, whether I am in bed or on the hotel room balcony</em></td>
</tr>
<tr>
<td>14</td>
<td>Express Checkout <em>helps me a lot as I am forgetful about the time and logistics to check out</em></td>
</tr>
<tr>
<td>15</td>
<td>Quiet Heater/Air Conditioning <em>enables me to think creatively on hard problems without distraction</em></td>
</tr>
<tr>
<td>16</td>
<td>Non-Smoking Room Available <em>is a must or I will have a headache while trying to work in my room</em></td>
</tr>
</tbody>
</table>
### Example 1 with KJ Affinitization (Hotel)

<table>
<thead>
<tr>
<th>ID#</th>
<th>Traditional Interviewing Statement</th>
<th>One theme of experience could be:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td><em>Expect</em> Reliable Room Service Delivery <em>so I don’t have to keep calling on status</em></td>
<td>As a very busy traveler, I need help in looking up information, contacting remote agencies and tracking a lot of detail, without human assistance or delay.</td>
</tr>
<tr>
<td>3</td>
<td>No-Hassle Check-In/Out <em>helps me avoid tracking a lot of detail during a business trip</em></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td><em>If my</em> Room Service Food <em>is not</em> Fresh &amp; Hot, <em>I have to spend time finding a local restaurant</em></td>
<td>An innovative solution could be:</td>
</tr>
<tr>
<td>6</td>
<td>Don't Lose Reservation <em>is a message I don't want to hear because I do not have access to my travel agent</em></td>
<td>A free application on a smart phone (or hotel issued device), which enables precise SIRI-like queries, and which also communicates with my TV and interactive displays throughout my room, balcony and other areas of the hotel, taking advantage of sensing my location.</td>
</tr>
<tr>
<td>7</td>
<td><em>I like it when</em> Room Service <em>is Available because I can avoid worrying about logistics</em></td>
<td></td>
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<td>Big TV <em>helps me see hotel area traffic, whether I am in bed or on the hotel room balcony</em></td>
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</table>

Adapted from affinity website - https://www.moresteam.com/toolbox/affinity-diagram.cfm
Exercise

In the following slide, we will practice KJ affinitization with a list of KJ report statements regarding user experiences with laptops. Identify at least two themes of experience. For each theme

• Provide KJ report statement ID numbers.
• Provide a brief title phrase reflecting the unstated theme of experience.
• Provide a 1-3 sentence rationale.
• If possible, identify solution to meet this unstated theme.

Remember:
1. There is no one correct answer to groupings.
2. Focus on the non-obvious, take a chance, think out-of-the-box.
3. We want maximum ideas!
## Identify at Least Two Themes of Experience

<table>
<thead>
<tr>
<th>ID#</th>
<th>KJ Report Statements on Home Computer Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I use my laptop everywhere: in bed, on couch, at Starbucks. I take it everywhere.</td>
</tr>
<tr>
<td>2</td>
<td>I want to be able to monitor contents of fridge for snacks.</td>
</tr>
<tr>
<td>3</td>
<td>I use a wireless mouse but it is just another accessory that I must track and set-up.</td>
</tr>
<tr>
<td>4</td>
<td>I like to use my laptop while sitting on my favorite couch watching 60” screen TV.</td>
</tr>
<tr>
<td>5</td>
<td>I communicate with others in the house via computer. It's easier than yelling.</td>
</tr>
<tr>
<td>6</td>
<td>My mouse is great, helping me easily follow links, surf web, and do look-ups.</td>
</tr>
<tr>
<td>7</td>
<td>When using laptop on my lap, it gets unacceptably hot on my legs.</td>
</tr>
<tr>
<td>8</td>
<td>I like to prepare lunch and do other tasks at home while working on my laptop.</td>
</tr>
<tr>
<td>9</td>
<td>I often forget to turn my wireless mouse off, resulting in depleted batteries that often need to be replaced or requiring me to use my touchpad instead.</td>
</tr>
</tbody>
</table>
Conduct Kano Analysis

Step 1: Evaluate existing knowledge of stated needs and requirements

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Step 8: Use AHP weighting and QFD matrix to determine quality and performance measures of delighters
The Kano model was developed by Professor Noriaki Kano in the 1980s.

The Kano model classifies the Unstated Need Solutions based on how the customer feels and the level of capability delivered. The model categorizes needs into three types:

1. **Must-Be**: (considered obvious; accepted as a given, almost without stating)
2. **Satisfier**: (normally stated as a need that would make the customer happy)
3. **Delighter**: (unstated, innovative, generates excitement)
How Kano May Be Used Within Requirements Elicitation Process

Kano Analysis is an approach that categorizes needs and requirements into one of three categories (“Must-Be” vs. “Satisfier” vs. “Delighter”).

All needs and requirements, whether stated or unstated, may be categorized using Kano analysis.

We will show Kano analysis conducted using a survey in which a pair of questions are asked for each unstated need.

Confirmed “Delighters” are then typically translated into requirements statements based on the rich-implementation Kano question.
Kano Analysis

For each innovative solution to an unstated need, develop a pair of questions that express the need as satisfied at two extreme levels of solution implementation.

Unstated Need: Without training, new users enter eligibility data correctly.

### Low

a. If the system alerts the user when a data entry error occurs, how do you feel?

   - 5) Delighted
   - 4) Satisfied
   - 3) Neutral
   - 2) Disappointed
   - 1) Very dissatisfied

### High

b. If, additionally, the system recommends remedial steps and logs the status to the system manager’s report, how do you feel?

   - 5) Delighted
   - 4) Satisfied
   - 3) Neutral
   - 2) Disappointed
   - 1) Very dissatisfied
Interpreting Kano Responses

Unstated Need: Without training, new users enter eligibility data correctly.

The system alerts the user when a data entry error occurs.

Questions
Level of Capability Delivered

How the Customer Feels

5 Delighted

4 Satisfied

3 Neutral

2 Disappointed

1 Very Dissatisfied

Delighter

Satisfier
(one dimensional)

Must-Be

5

4

3

2

1

a. Low to None

b. High

Additionally, the system recommends remedial steps and logs the status to the system manager’s report.

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From Themes to Unstated Needs and Requirements

**Theme:** I want to eat and drink without damaging my laptop.

**Rationale:** KJ report statements imply the presence of food and drink near the laptop.

**Unstated Need:** Home laptops are resistant to damage from food and drink.

**Unstated Need:** Home laptops recognize when food and drink are nearby and go into a safe mode.
KJ Summary

KJ is a method for transmuting *tacit* into *explicit* knowledge consisting of objective statements …

… and refining a collection of these statements that conveys context information and themes of experience.

Adapted from David Hallowell, “Language Data: The ‘Other Data’ of Six Sigma: Parts 1 & 2,”
http://www.isixsigma.com/library/content/c040303b.asp
Questions