

Cost vs. benefits-A survey of UCD practice

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Introduction

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❖ Research questions:

- ❖ Which UCD methods are most widely used and why?
- ❖ What are the benefits and weaknesses of each method in the eyes of the practitioners?
- ❖ What are the organizational impacts of UCD and what measures are in place to assess progress?

❖ The purpose of this research

- ❖ To provide an empirical basis for UCD planning, training, adoption and execution.
- ❖ To know key success factors for the most widely used methods and techniques, common difficulties and concerns with various methods, and cost-benefit tradeoffs.



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❖ Prior surveys

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● two phases

1. UCD process was not often used in practice

- Gould et al. claimed that the user-centered design process was still not often used in practice due to both organizational and technical reasons.
- Nielsen (1994) argued that many developers do not use usability engineering techniques because they are considered intimidating in their complexity, too time consuming and expensive



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❖ Prior surveys

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● two phases

1. UCD process was not often used in practice

2. Several surveys have been conducted recently on UCD practice

- Rosenbaum et al. (2000) surveyed 134 CHI professionals with a focus on the contribution of organizational approaches and UCD methods to strategic usability. Partnering with marketing was identified as a very effective approach.
- A 10-question web survey was conducted recently involving 100 usability practitioners (Gunther, Janis, & Butler, 2001).



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Results

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- ❖ The most common size of the project team was 10 people.(31%)
- ❖ In 65% of the cases, one or two team members (33% and 32%, respectively) were charged with UCD activities as their primary responsibility, and the rest had more.
- ❖ In common 10% of the total budget was spent in the UCD projects



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❖ **UCD is a multidisciplinary approach which involves users in all the three stages viz discovery, design and development.**



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Results

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- ❖ **UCD expenditure in common often exceed 10% of overall budget of the project**
- ❖ **72% of the participant of the survey reported that UCD methods had made significant impact on their product development.**



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Results

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- ❖ Majority of the participant reported that UCD methods had improved usefulness and usability of their product(79% and 82% respectively)
- ❖ 44 % believed that UCD methods saved the product development cost while 24% were against this thought
- ❖ Identical result was found for the product development time too.



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List of methods for UCD

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- ❖ Cognitive workload
- ❖ Collect feedback
- ❖ Context of use
- ❖ Cost-benefit analysis
- ❖ Evaluate existing system
- ❖ Evaluate prototype
- ❖ Evaluate working system
- ❖ Expert evaluation
- ❖ Feedback in use
- ❖ Field study
- ❖ Focus groups
- ❖ Functionality matrix
- ❖ Instructional systems design
- ❖ ISO 9241 software
- ❖ conformity assessment
- ❖ Maturity assessment
- ❖ MUSiC methods (Measuring the Usability of Systems in Context)
- ❖ Observe users
- ❖ Parallel design
- ❖ Performance Measurement Method
- ❖ Planning usability
- ❖ QUIS user interface
- ❖ Questionnaire



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List of methods for UCD

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- ❖ Stakeholder meeting
- ❖ Storyboarding
- ❖ Style guides
- ❖ SUMI attitude questionnaire
- ❖ SUS attitude questionnaire
- ❖ Task allocation
- ❖ Task analysis
- ❖ Task scenarios
- ❖ Test existing system
- ❖ Usability assurance
- ❖ Usability context analysis
- ❖ Usability maturity model
- ❖ Usability planning
- ❖ Usability requirements
- ❖ Usability testing
- ❖ Video prototyping
- ❖ Web site design
- ❖ Wizard-of-Oz prototyping
- ❖ Requirements for usability
- ❖ Satisfaction
- ❖ Scenarios



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Results

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- ❖ **Iterative design, usability evaluation, task analysis, informal expert view and field studies were the five most used UCD methods by the participant.**
- ❖ **Informal expert view was the most used among the five methods in average (due to its low cost)**



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Results

LOGO

- ❖ On the other hand requirement analysis which is more difficult to conduct and more expensive was mentioned by very few participants.
- ❖ It means that cost-benefit trade off played major role in the adoption of UCD method.



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Results

LOGO

- ❖ **Speed, low cost and validity/quality of results** were ranked as top three benefit associated with UCD methods.
- ❖ **Amazing fact was that for example, speed was perceived both a strong benefit of informal expert review and a strong weakness of iterative design.**



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Useful information

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- ❖ The top three sources of their UCD knowledge and expertise are books and journals (91%), professional conferences or workshops(91%), and colleagues (82%).
- ❖ The most common size of the project team was 10 people.



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Useful information

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- ❖ Five of the UCD methods were considered commonly used: They were iterative design, usability evaluation, task analysis, informal expert review, and field studies. (informal expert review was widely used (likely because of its low cost), but not considered to have a high impact. In contrast, *user requirements analysis*, which is typically more expensive and difficult to do, was mentioned by only few people as commonly used, but was considered very important in practice by the few believers.)



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Useful information

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- ❖ The most parsimonious and explanatory model is: $\text{UCD impact} = \beta_0 + \beta_1 * \text{Multidisciplinary team} + \beta_2 * \text{Centralized organization of UCD} + \beta_3 * \text{Task analysis involving end-users}$ Where $\beta_0 = 2.71$, $\beta_1 = 1.97$, $\beta_2 = 1.05$, $\beta_3 = 1.22$, and all β 's are significant ($p < .02$).



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Conclusion

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- ❖ **cost-benefit tradeoffs play a major role in the adoption of UCD methods**
- ❖ **UCD methods are generally considered to have improved product usefulness and usability**



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Conclusion

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- ❖ **The growing popularity of e-commerce has significantly bolstered the appeal of usability and UCD, as users can take their business elsewhere with just one mouse click.**
- ❖ **But still the degree of UCD adaptation is quiet uneven across different organization**



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Conclusion

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- ❖ **During long run, applying UCD saves development time and money by reducing the amount of rework needed.**
- ❖ **In light of growing trend of e-commerce and higher demand for the product usability, UCD practice continues its growth and acceptance among organization.**



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Conclusion

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- ❖ **Still very less (5%) used the multidisciplinary approach of UCD that includes user participation in all three phases viz, dsicovery, desing and development.**



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References

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- ❖ <http://www.cs.chalmers.se/idc/ituniv/kurser/05/ucd/papers/L1%20UCD%20concept-V1.pdf>
- ❖ <http://doi.acm.org/10.1145/503376.503460>
- ❖ <http://doi.acm.org/10.1145/1047671.1047677>



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Presentation for UCD course

Affinity diagrams

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- Seven management tools
- What is Affinity diagrams
- Affinity diagrams usage
- Creating affinity diagram
- Example
- Good and bad practices

Seven management tools

- **Affinity Diagram (KJ Method)**
- Interrelationship Diagram (ID)
- Tree Diagram
- Prioritization Matrix
- Matrix Diagram
- Process Decision Program Chart (PDPC)
- Activity Network Diagram

Affinity diagrams (AD)

An affinity diagram is a technique for organizing verbal information into a visual pattern. An affinity diagram starts with specific ideas and helps you work toward broad categories. This is the opposite of a cause and effect diagram, which starts with the broad causes and works toward specifics. You can use either technique to explore all aspects of an issue. Affinity diagrams can help you:

1. Organize and give structure to a list of factors that contribute to a problem.
2. Identify key areas where improvement is most needed.

Affinity diagrams (AD)

- Also called the KJ method (after its developer Kawakita Jiro);
- Helps to synthesize large amounts of data by finding relationships between ideas;
- The information is then gradually structured from the bottom up into meaningful groups;
- Most commonly used at the end of a 'brainstorming' session where many disparate thoughts have been collected.
- Each of the thoughts are written on a separate sticky-note, and these are stuck up on a large flat wall resulting in 'affinities' or groups of ideas.

Main purposes of AD

- Draw out common themes from a large amount of information;
- Discover previously unseen connections between various ideas or information;
- Brainstorm root causes and solutions to a problem.

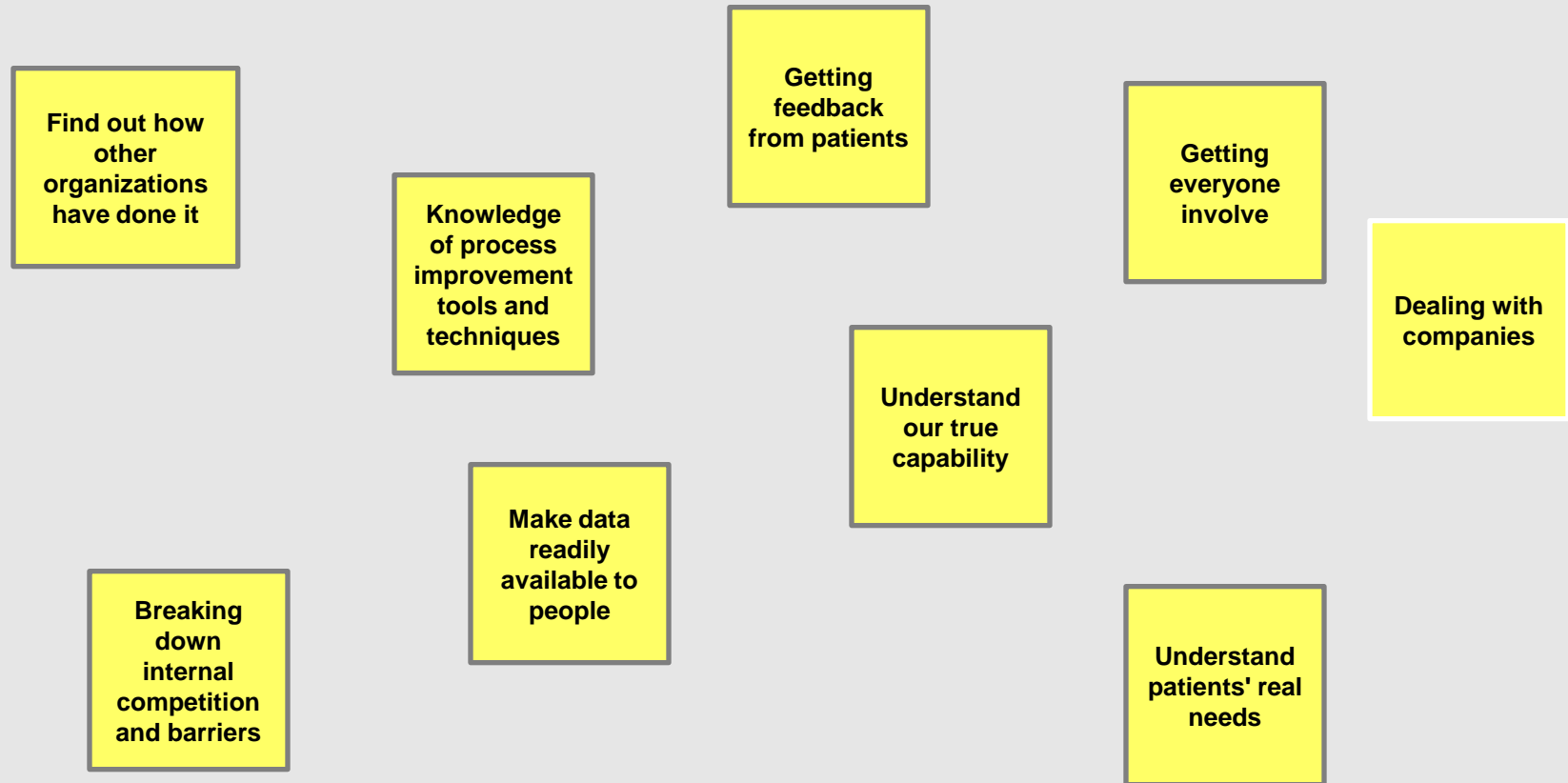
When AD can be used

- The solution is not readily apparent;
- You have a lot of variables, concepts, ideas or opinions to be processed. And you want to reach some definite decision;
- There is a large volume of information to sort through.

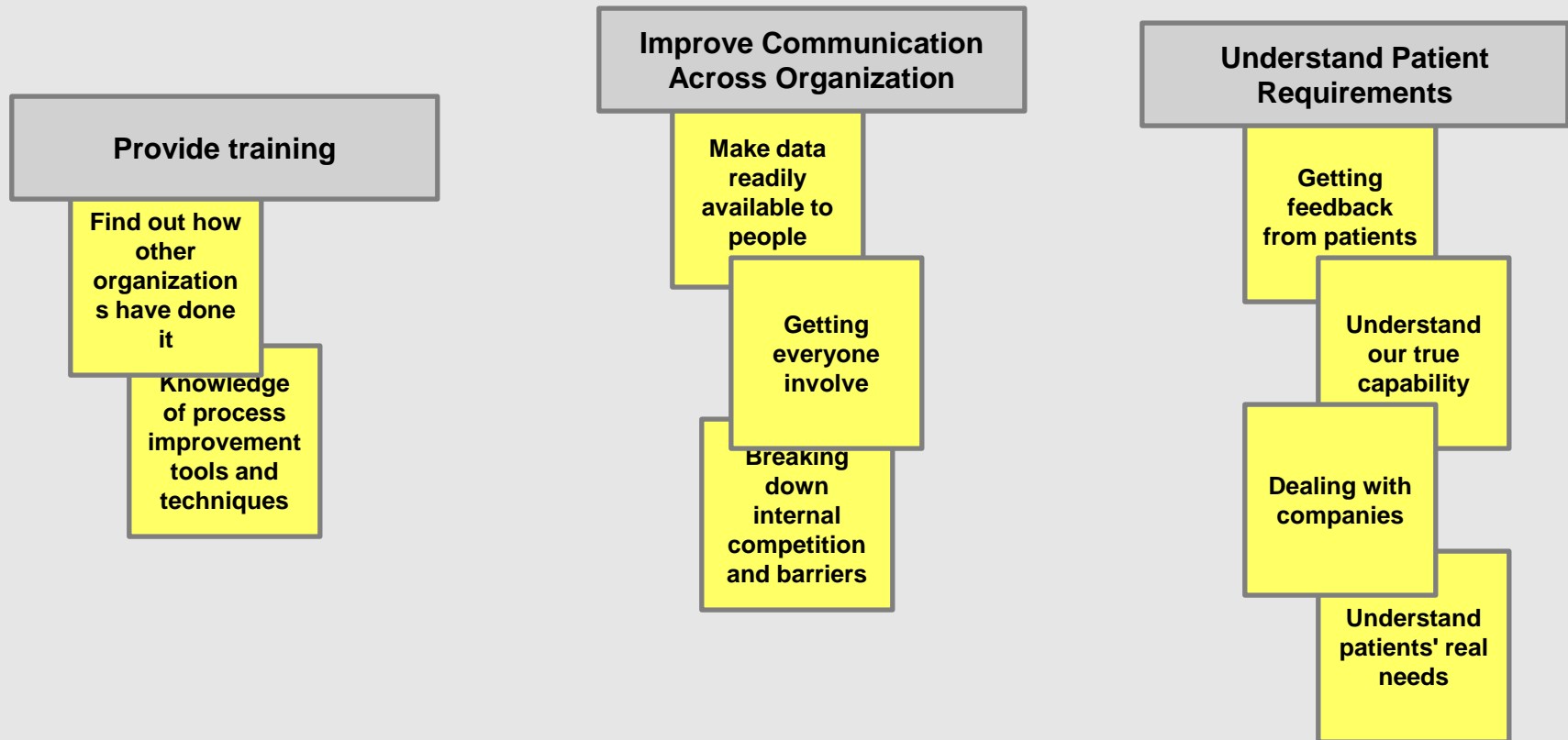
How to create AD

1. Define the problem or issue to be explored;
2. Brainstorm for ideas and write down them on stickers;
3. Mix up all of the notes and stick them on the wall;
4. Let the group arrange the notes or cards into related groups;
5. Decide how to call each group. The header card should clearly define the common thread of a group.

How does it look like - start



How does it look like - end



How does it look like - sample

PRODUCT DOES NOT PROVIDE SUFFICIENT INFORMATION FOR USE

Car's ignition key won't come out unless steering wheel is jiggled
Deskjet printer's picture of envelope is seen as inverted to actual use
Difficult to find opening on "Easy Flap" tall kitchen bags
Difficult to find door opening switch on microwave; button and marking is on top and not the front

PRODUCT DOES NOT PROVIDE CUSTOMER WITH SUFFICIENT CONTROL

Difficult to set precise cooking time with microwave's dial timer
Television's channels can only be changed via the remote (TV has no "channel" button)
Difficult to control water height with switches on water fountain

PRODUCT NEEDS TO BE CONSTANTLY RESET

Tape recorder headphone fits too loose and dislodges easily
Screws loosen quickly on the sit-up exercise machine
Small stapler frequently pops open during use
Cordless phone handset falls off easily when phone is mounted on wall

PRODUCT COMPONENTS ARE INCOMPATIBLE

Lack Internal Compatibility:
Candle too big for accompanying candlestick
Laces on kid's tennis-shoe are too long
A brand-name container of frosting is insufficient for covering a cake made with its own standard cake mix

Lack External Compatibility:
Toothbrush case too short to hold most toothbrushes
Shelves of video cabinet won't hold the somewhat taller Disney video boxes
Spiral notebook folder in front cover will only hold notebook's own paper and not the 8½x11-inch standard size paper

PRODUCT HAS MISSING FEATURE

Analog-digital watch has only "forward" button for reset
Car's doors will not hold open on incline
Office organizer has no penholder
Answering system does not cut off when phone is answered

PRODUCT HAS DYSFUNCTIONAL FEATURE

Inside base of shoe made of material that slips with socks
Pockets in 3-ring binder not deep enough
Two-way phone jack falls off with the weight of two connected phone wires
Toaster's power cord comes out from front of toaster instead of the back

PRODUCT FALLS APART SOON

Car's seat-belt cover breaks off frequently
Bendable straws get holes in them when bent
Flap holding "D" ring to satchel book bag soon tore off the bag
Elastic on fitted sheets loses elasticity in only a few months

PRODUCT DIFFICULT TO ACCESS

From Package:
Extra-strength flu capsules' package couldn't be opened by hand
CD seal too hard to remove
Difficult to break the safety seal of a soft-drink bottle

In Use:
Child's backpack clip can't be squeezed open by kids
Caller ID readout on phone is on the inside and can't be seen when phone is hung up
To open the vehicle's tailgate one has to disconnect and reconnect the soft top

For Servicing:
Inaccessible battery in car
Battery fits too tightly in calculator
Washer fluid jets designed into the car's wipers get misaligned when wiper blades are replaced

How does it look like - sample



Good practices

- Write clearly on sticky notes;
- Divide large groups of ideas on subgroups;
- Make sure that ideas are clarified;
- While sorting, physically gather around where sticky notes are placed.

Bad practices

- Have more than 8 people, working on one affinity diagram;
- One-word notes;
- Sort before everyone is ready.

Thank you for your attention!

Questions?

If you have any comments or suggestions please feel free to contact us:

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Contextual Inquiry I

By Monika Machunik

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AGENDA

- Contextual Design in a nutshell
- Contextual Inquiry
 - Master/apprentice model
 - Four principles of Contextual Inquiry
 - Context
 - Partnership
 - Focus
 - Interpretation
 - Interview

Contextual design concepts

- Contextual inquiry
 - Work modeling
 - Consolidation of work models
 - Work redesign
 - User environment design
 - Mock up and test with user
-

*“When you are
watching the
work happen,
learning is
easy”*

The Master – Apprentice Model

- An apprentice learns a skill from a master
 - *A design team learns about its customers' work from its customers*
- When you are watching the work happen, pre-planned teaching is not required
 - *Master craftsman teaches on the fly*
- Master do not need to remember his work explicitly
 - *Seeing the work reveals what matters*

The Master – Apprentice Model

- Talking while doing the work reveals the details
 - Being in the context of work reminds one of many tasks
 - Seeing the work reveals the structure
 - Every current activity recalls past instances
 - Apprenticeship suggests an attitude of inquiry and learning
-

*"Go where the work is to get
the best data"*

Context

- Summary vs. ongoing experience
 - avoid summary data by watching the work unfold
 - discover the structure and details of the work
 - being present while the work is ongoing makes the detail available

Context

- Abstract vs. Concrete data
 - Concrete data matters
 - *"In our group we usually do.."*—abstraction
 - *"That time we did..."* — real experience
 - Avoid abstractions by returning to artefacts and events
 - *"We usually get reports by email"* ask *"Do you have one? May I see it?"*
 - Keep the customer concrete by exploring ongoing work

***"Partnership creates
a sense
of a shared
quest"***

Partnership

- The traditional interview tilts power too much towards the interviewer;
- On the other hand, the typical master/apprentice relationship model gives too much power to the master; the designer is discouraged to ask too many „why” questions;
- The solution is that the interviewer should create a partnership, not just an apprenticeship!
- In a partnership relation designer and the customer work together on the task; they are cooperating;

Partnership: avoid other models

- If you fall into one of other *popular* relationship models, your client will automatically start to play role of the other side of the relation;
- Avoid other relationship models:
 - Interviewer / interviewee
 - both interviewer and customer start as if there was a questionnaire to be filled out
 - repeated "question – answer" cycle
 - ✓ solution – ask the customer to go back to ongoing work;

Partnership: avoid other models

- Expert / novice (designer as the expert)
 - The designer is concerned as someone who knows the system best;
 - Especially when the customer is trying out an existing version of the system, he will try to ask the designer every time he is uncertain about something;
- ✓ solution – don't answer customer's questions about how to use the system; explain him why;

Partnership: avoid other models

– Guest / host

- It is the customer's workplace so the designer might want to behave like a guest; he tries to be polite, not too nosy;
- The host wants his guest to feel comfortable and see all his needs;
- That is not what this should be about!
- ✓ solution – go to partnership model as soon as possible; concentrate on your task; ask questions, be nosy;

Partnership: sum up

- When your client calls you saying:

”come here, you want to see this!”

- then you know you created a good partnership relationship :)

***"Focus
reveals
detail"***

Focus

- What should we focus on?
 - Everyone will focus on different things as we all have different experiences and backgrounds;
 - What's the solution?
-

Focus

- We have to **extend** our focus;
- We do that by activating *intrapersonal triggers*;
- These are our emotional reactions; if we learn to notice them, we will know when we are in danger of overlooking something; we will be then able to take an appropriate action; we'll recognize new opportunities;

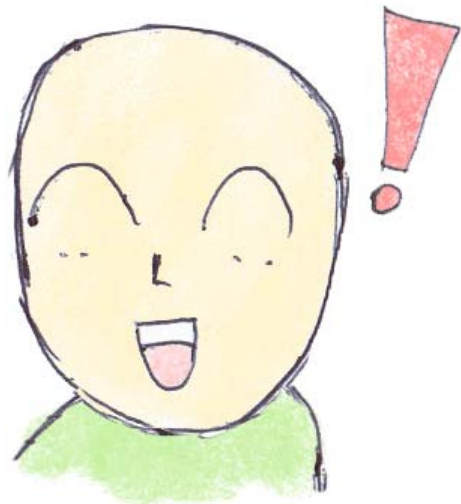
Focus: intrapersonal triggers



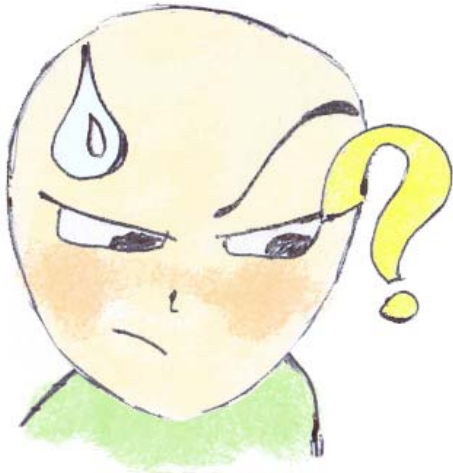
- Surprises and contradictions
 - The customer says or does something that you know is „wrong”
 - The customer does something for no particular reason
- Watch out! This means you did not fully understand the point of view of the user;
- The tendency is to let it pass as irrelevant – you should do the opposite!

Focus: intrapersonal triggers

■ Nods

- What customers says fits perfectly with your assumptions
 - You nod
- 
- By nodding you are telling the customer you know exactly what he has in mind – is that a safe assumption?
 - You should always take the attitude like everything what you hear and see was new to you

Focus: intrapersonal triggers



- What you don't know
 - You simply do not understand what the customer says;
 - You don't know enough technical details to know what the customer is talking about;
 - There's a temptation to put off thinking about this subject until you get back to your office;
 - You should admit your ignorance and ask the customer to explain the subject to you step-by-step;

Interpretation



WHAT DOES
IT MEAN ?



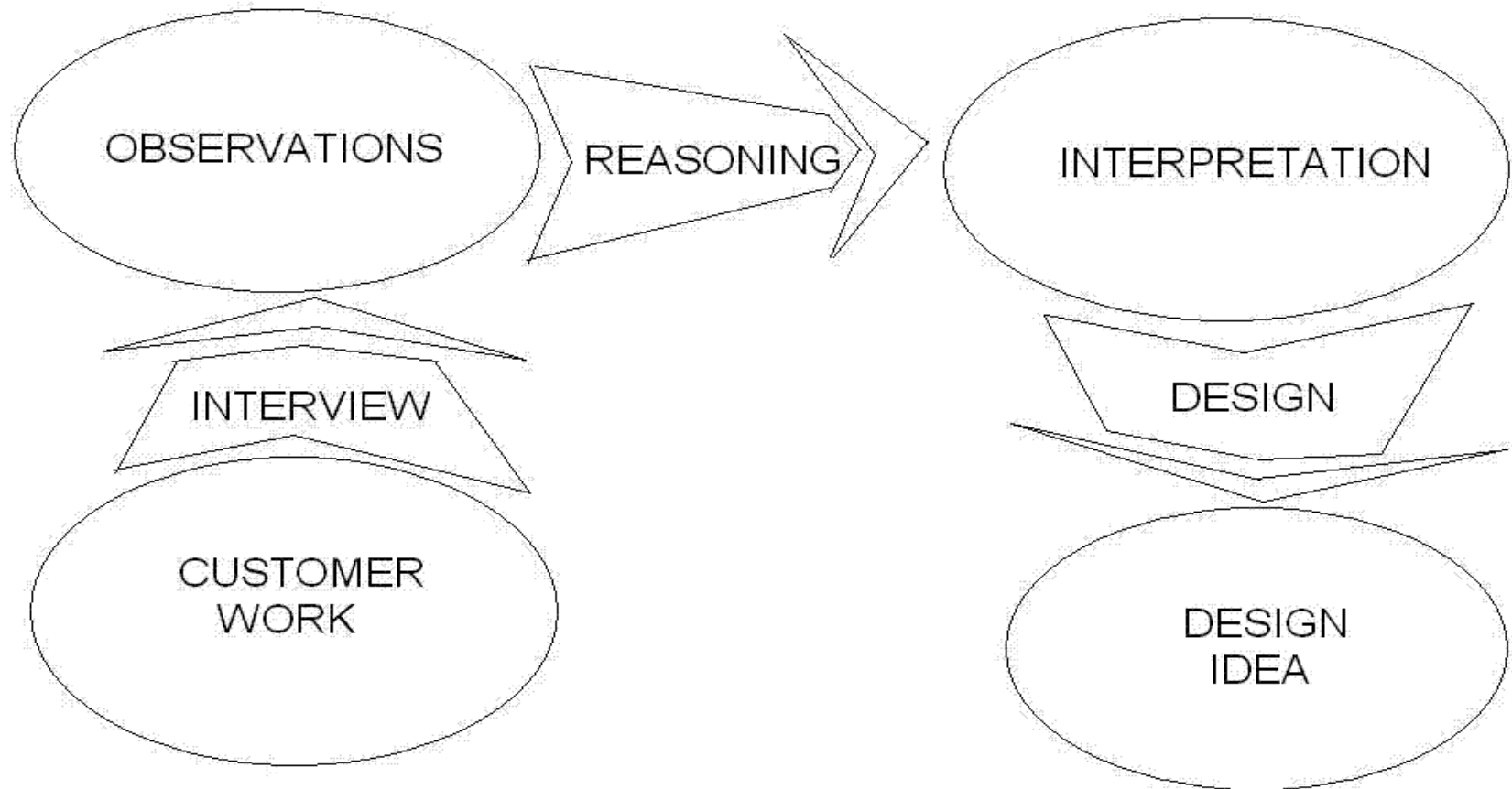
Interpretation(1)

- Observations are not the aim of Contextual Inquiry. They are only base for the **interpretation**.
- Interpretation - the way in which we are thinking about the customer's work; some kind of impression on the customer's tasks; what we consider to be important and what is unimportant;
- The main aim of designer is to design the system, but the observations are not a good base to do so. Much better it is to base design on summary of observations (interpretation).

Interpretation(2)

- Contextual interview gives us a set of observations (facts).
- These facts are starting points for chain of reasoning, which leads us to the final interpretation.
- So if the observations and reasoning are correct we should obtain also a right interpretation.
- Two dangers:
 - wrong observations
 - incorrect reasoning

Interpretation(3)



Interpretation(4)

- One fact might be interpreted in many different ways. It depends on designer's character, background, experience and so on.

Interpretation(5)

- Interpretation is the chain of reasoning, which finally might have influence on particular design idea.
- The most important thing is to ensure that the interpretation is correct. (Designer should never end the Contextual Inquiry without ensuring that client approve his interpretation)
- Interpretation is the last part of Contextual Inquiry, so it is also the last opportunity to solve the misunderstandings!

Interpretation(6) - psychology of evaluation

- Customer might approve or reject the interpretation.
- Customers can also say “no”, but not in the direct way. So interviewer should be aware of that.
 - “Huh?” or other strange sound - Interpretation is completely wrong
 - “Ummm ... could be” - This means “no”.
 - “Yes but...” or “Yes and...” - It depends on what follows the word "but" or "and".
- Like in other stages of Contextual Inquiry, in the interpretation very important is to keep a partnership relation with your client.

The Contextual Interview Structure

The Contextual Interview Structure

- The most common structure for the Contextual Design is Contextual interview: a one-on-one interaction lasting two to three hours, in which customer does her own work and discusses it with the interviewer.
- Each interview has four parts:
 - The conventional interview
 - The transition
 - The contextual interview proper
 - The wrap-up

The Conventional Interview

- This part looks like common interview. In this phase the interviewer and the customer get used to each other as people.
- The interviewer gets permission to tape and starts recorder.
- The interviewer explains that the customer and his work are primary.
- The interviewer gets an overview of the job.
- This phase should last up to 15 minutes.

The Transition

- In this part conventional interview changes into contextual interview.
- The interviewer describes rules of the contextual design:
 - The customer will do her work while the interviewer will watch.
 - In case of any doubts, questions, the interviewer will interrupt the customer and ask a question.
 - If the interviewer interrupts in the bad time, the customer might say that it is not proper time to interrupt.
- This phase is important. If the rules of contextual interview don't be state explicitly then interviewer might conduct a conventional interview instead of contextual interview.
- This phase should last about 30 seconds.

The Contextual Interview Proper

- The main part of the interview.
- The customer do his job and the interviewer observes and interprets.
- The interviewer should be as nosy as it is only possible.
- Four principles: **context**, **partnership**, **interpretation** and **interview** are guides for that phase.
- If needed there might be a short break during that phase.

The Wrap-up

- Last part of the contextual interview.
- This part evaluates the interviewer understanding of the customer's work.
 - The customer has last chance to correct the misunderstandings.
- This phase usually takes 15 minutes.

References

- Hugh Beyer, Karen Holtzblatt *Contextual Design: Defining Customer-Centered Systems*
- Jenny Preece, Yvonn Rogers, Helen Sharp *Interaction Design: beyond human-computer interaction*
- Janette M. Coble et al *Using Contextual Inquiry to discover physicians' true needs*