



UiO : Universitetet i Oslo

in1060 analyse & kritisk refleksjon

Tone Bratteteig



in1060: 12/3 2018

analyse

ana: gjennom, opp, bak

lysis: løsne

dvs. å løse opp noe (komplekst) til enklere elementer

Dele opp i mindre elementer, studere hver del nøye

- kan endre forståelsen av både del og helhet

- se etter måter å sette delene sammen på (ut fra ulike spørsmål)

syntese (*syn*: sammen og *tese*: plassere, sette)

dvs. sette sammen deler til en (ny) helhet

**Old Habits as a Resource for Design:
On Learning and Un-learning Bodily Knowledge**

Tone Bratteteig
Department of Informatics
University of Oslo
P.B. 1080, 0316 Oslo, Norway
tone@ifi.uio.no

Guri Verne
Department of Informatics
University of Oslo
P.B. 1080, 0316 Oslo, Norway
guribv@ifi.uio.no

Abstract—There are many reasons why artifacts and systems are difficult to use in practice. In this paper, we investigate such difficulties as a basis for design for ease of use. Difficulties may stem from the artifact or system itself, or from the artifact or system in use in its real use context. Technology introduces new tasks, and both learning new tasks and unlearning old habits can be challenging. We discuss how users' previous knowledge and habits can be used to understand how and why an artefact is difficult to use. This understanding is useful for designing artefacts that are easy to use. We end the paper with presenting a conceptual framework for design for coherence and simplicity from the users' perspective, where users' habits and bodily knowledge act as resources for design.

Keywords—usability; habits; automated behaviour; automation; participatory design.

I. INTRODUCTION

Usability is often defined as the ease of use and learnability of an artifact, sometimes narrowed down to specific users in a specified use context having specific achievement goals (e.g., ISO 9241). But what does "ease of use" mean more precisely? We have tried to find out what it is that makes some artifacts difficult to use for some users. This paper builds on an earlier paper [1] and expands the empirical material as well as the depth of discussion of possible reasons why some things turn out to be difficult to use. Our aim is that knowledge about how a piece of technology is difficult to use can be used as a basis for designing solutions that are easy to use.

Much of the research on artefacts that are easy – or difficult – to use is based on Nielsen [2], who lists five aspects of usability: learnability, efficiency, memorability, low error rate, and satisfaction. A more elaborate list is given by [3], who present eight aspects: consistency, universal design, feedback, closure of dialogs, reversal of action, control, error prevention, and memory load. Except for universal design, all the aspects are general and concern the design of the artifact seen as a stand-alone context-independent thing. Our research shows, however, that it is difficult to achieve a total independence of contextual design elements – it is impossible and even unwanted: "All products make some reference to either products extant during

previous generations or products from different companies or product families." [4]. Such references are important to build on when trying to understand how to use the product. Even well-designed stand-alone artifacts can be difficult to use for users not sharing the contextual competence pre-supposed in the design. We have seen this in our and our colleagues' research, where we focus on elderly people and the technological support that is supposed to enable them to live independently in their homes longer [5].

The paper is structured as follows: Section II gives a review of literature about problems in using technologies. In Section III, we present two studies of use of technology: the use of public services like tax, and the use of common home artifacts like remote controls or mobile devices that need charging. Section IV summarizes the challenges we have identified in our research. In Section V we discuss the competencies users need to use an artifact, and how such competencies are experienced and embodied. Section VI summarizes what we have found to make things difficult to use. In Section VII, we turn to design for ease of use: we discuss how we can go from knowing about the difficulties people have using an artifact to design of an artifact that is easy for them to use. We divide the discussion in two parts, addressing first how designing with users can end up with design results that are easy to use, and lastly we discuss a more general approach to automation that addresses how the design itself creates user problems and how these can be resolved. Section VIII concludes the paper.

II. PROBLEMS WHEN USING TECHNOLOGY

A close study of people using IT artifacts reveals that they often find technology difficult to use (e.g., [6]). A classic study is Suchman's study of use of a Xerox copy machine [7][8] demonstrating how operating a copy machine was difficult due to the difference between the scripted "plan" in the copy machine and the users' (situated) understanding of copying. Another classic is Gasser's study of how people work around computer systems that do not fit the work they need to do, which shows that people carry out their jobs also with non-supporting artifacts [9]. Even when an IT system works well, it may not work well together with other systems [10][6]. Just using more than one system can

hvordan vi designe noe som er lett
å bruke ut fra å vite hva som er
vanskelig å bruke?

-identifisere problemer m. bruk
-hva gjør ting vanskelig å bruke?

- dårlig design av system
- systemet i bruk
- andres handlinger

-gir ulike utfordringer
-kompetanse

- hva vi vet
- hvordan vi vet
- læring & avlæring

-hva er vanskelig sett fra bruker
-design for lett å bruke

Again our second set of examples is everyday technologies used by elderly people in their homes. We found that these types of difficulties arise when people use technologies that they do not have previous experience with. One example is an active woman, approximately 85 years old, who uses a hearing aid. She is well organised, educated, and has had an active work life, and she uses everyday technologies like her TV effortlessly. Her occupational therapist has tried to teach her how to use an amplifier for her hearing aid: a wireless microphone that amplifies sounds and submits to her hearing aid.



Figure 1. Welfare technology: Tablet charging (above), stove alarm (below).

The “accessory pen” is easy to use once fitted to the hearing aid: the manufacturer says that it is “zero hassle” because it is “completely simple to use, with one-click connection of receivers and fully automated settings” [30]. Using the pen involves pushing one small button in addition to charging it. However, the old woman finds the pen difficult to use. She does not remember how to use it from one therapist visit to the next. She has to be reminded to use it from a subsequent visit to the therapist. She has to be reminded to use it from a subsequent visit to the therapist. She has to be reminded to use it from a subsequent visit to the therapist.

hvordan vi designe noe som er lett å bruke ut fra å vite hva som er vanskelig å bruke?

- identifisere problemer m. bruk
- hva gjør ting vanskelig å bruke?
 - dårlig design av system
 - systemet i bruk
 - andres handlinger
- gir ulike utfordringer
- kompetanse
 - hva vi vet
 - hvordan vi vet
 - læring & avlæring
- hva er vanskelig sett fra bruker
- design for lett å bruke

Difficulties that stem from others' actions and interactions are the hardest challenges to meet. It seems that errors that stem from other people's actions are particularly difficult to understand as they often surface in unexpected ways and need some kind of "debugging" to be comprehensible. This kind of debugging requires special competence and can be time-consuming. External help is often needed to disentangle difficulties that stem from complex interactions [27]. And often there is not one best solution [14].

We sum up the kinds of difficulties in Table I, and indicate what kinds of challenges they pose.

TABLE I. DIFFERENT KINDS OF DIFFICULTIES WITH ARTIFACTS AND SYSTEMS, AND THE CHALLENGES THEY POSE

What is difficult?	Kinds of difficulties		
	<i>Artifact</i>	<i>Context</i>	<i>Activities by others</i>
Examples:	Holding the turn-off switch. Positioning of the charger. Online tax self services	Personal economy when retiring. Tax deductions for renting out a house to family. Tax card when starting a new job	Bankruptcy by an employer. Welfare agency "ties up their systems". Errors made by subcontractors.
Challenges:	Practical measures: moving a charger, teaching.	Matching artifact with own life situation or circumstances	Disentangling interactions and complexities

Even though the challenges that meet the users are different, the general feature is that users need experience from previous similar situations in order to be able to differentiate between approaches to resolving the difficulties. The competence for addressing problems can be gained in many ways.

V. COMPETENCE

Competence, as the ability to do something successfully or efficiently, is important for using technology. The examples in Section III show that competence can concern the design that makes the operation of the technology

hvordan vi designe noe som er lett å bruke ut fra å vite hva som er vanskelig å bruke?

-identifisere problemer m. bruk
-hva gjør ting vanskelig å bruke?

- dårlig design av system
- systemet i bruk
- andres handlinger

-gir ulike utfordringer

-kompetanse

- hva vi vet
- hvordan vi vet
- læring & avlæring

-hva er vanskelig sett fra bruker

-design for lett å bruke

and unlearning old tasks, but we argue that analytically they create different kinds of challenges.



Figure 2. A retired woman just laughed about using her large-sized and simplified remote control for her TV set (normal remotes to the left).

Wu et al. [41] present a participatory design project with people with anterograde amnesia, aimed at developing a “memory aid” for and with them. They base their design on the fact that “amnestics rely heavily on external memory aids, such as a calendar or an action item list.” (p. 217). Their design provides a “tool [that] will assist amnestics when they feel lost or disoriented by providing information as to their whereabouts and their intent for being where they are. A person having amnesia will typically follow familiar routines in their daily life, such as the same route home, because deviating from this path will often result in disorientation. Our tool enables an amnesic to grow increasingly confident and independent in exploring new

hvordan vi designe noe som er lett å bruke ut fra å vite hva som er vanskelig å bruke?

-identifisere problemer m. bruk
-hva gjør ting vanskelig å bruke?

- dårlig design av system
- systemet i bruk
- andres handlinger

-gir ulike utfordringer

-kompetanse

- hva vi vet
- hvordan vi vet
- læring & avlæring

-hva er vanskelig sett fra bruker

-design for lett å bruke

the user unless s/he has a deep knowledge of the complexity of the technology in its social environment.

We sum up our analysis of what is difficult in Table II, expanding Table I with rows from this more detailed analysis of the nature of the difficulties.

TABLE II. WHAT IS DIFFICULT SEEN FROM THE USER

What is difficult	Kinds of difficulties		
	Artifact	Context	Activities by others
New tasks to learn	Holding the turn-off switch. Positioning of the charger. Online tax services.	Personal economy after retiring. Charge device after use. Check pre-completed form	Check and act if something unusual
Old tasks to unlearn	Handling paper forms. Putting kettle on stove.	Charge device before use. <i>Not</i> pushing the horse. Changed tax rules.	Need trust to stop doing.
Basic knowledge for the task	Understand tax and web pages. Understand a water boiler.	When does the new apply?	Understanding the ecology of humans and technology
Challenges:	Practical measures: moving a charger, teaching.	Matching artifact with own life situation or circumstances. Differentiating between old and new.	Disentangling interactions and complexities.

All the elements in Table II point to existing competence or lack of competence presupposed by the artifact that may make the artifact difficult to use. But how do we go from knowing what is difficult-to-use to designing something that is easy-to-use?

VII. DESIGNING FOR EASE-OF-USE

The three different kinds of difficulties can be a basis for approaching design of easy-to-use technology solutions. In this section, we report from some design experiments with elderly people by colleagues and students [5][18][29][42][43], as well as our own design suggestions based on

perception (e.g., music, smells) and can be carried out without conscious deliberation. A design that incorporates that the user can rely on his/her old habits can make the changing of old practices more likely and the design more robust. Robustness towards unintended and unexpected use

hvordan vi designe noe som er lett å bruke ut fra å vite hva som er vanskelig å bruke?

-identifisere problemer m. bruk

-hva gjør ting vanskelig å bruke?

- dårlig design av system
- systemet i bruk
- andres handlinger

-gir ulike utfordringer

-kompetanse

- hva vi vet
- hvordan vi vet
- læring & avlæring

-hva er vanskelig sett fra bruker

-design for lett å bruke

Figure 3. The prototypes for the knob (above) and the digital radio (below).

Photo by Johnsen et al. [43]

perception (e.g., smells, sounds) can be carried out without conscious deliberation. A design that incorporates that the user can rely on his/her old habits can make the changing of old practices more likely and the design more robust. Robustness towards unintended and unexpected use is important for the user's ability to manage and carry on with the original task (see e.g., [44]).

Designing for new habits in old age is possible, as the example of the memory aid for the amnesic people above showed [41].

In the large project on evaluation of technologies for independent living, designing for ease-of-use has been explored in two ways: through design of artifacts that resemble familiar technologies [45], and by collaborative design with elderly people on designing or testing different technological solutions in order to identify what works with a minimum of new tasks to learn.



Figure 3. The prototypes for the knob (above) and the digital radio (below). Photo by Johnsen et al. [43].

An example of the first design approach is the design of a digital radio that was co-designed with in total 25 elderly people [43]. Johnsen et al. aimed to design interaction mechanisms that built on old and familiar bodily skills when designing a new way of operating a digital radio [ibid]. Using rotary controls for operating the radio – like in the old days – enabled them to make sense of the interface with their body even if they intellectually could not understand or remember how to turn on the radio. They easily recognized the button as a device for rotary movement. Several buttons were designed and tested for a good grip for old hands and

recognizable positioning with different textures and shapes [43], see Fig. 3.



Figure 4. Testing several different induction chargers. Photo: Iversen [42].

The second design approach involved testing a large number of different solutions to the same problem. One example is a test of induction chargers carried out to identify problems and ease-of-use [29]. As a way to provide easy charging of phones, Iversen and Joshi [29] collected seven different off-the-shelf induction chargers and asked a group of elderly men to evaluate them (see Fig. 4). Trying out different technologies and experiencing how they offered different degrees and kinds of difficulties turned out to be instructive to the elderly users as well as to the designers. Furthermore, Joshi [45] built on knowledge about earlier habits, e.g., the fact that in “the old days” (i.e., when they were young adults) telephones had wires and were usually located in a specific place, on a particular table by the entrance door. Maybe it would be easier to charge the mobile phone if, instead, always putting the phone in “its place” was the thing to remember (see e.g., [46]).

Another example is from a participatory design process organized and facilitated by Stark [31]. A group of elderly visitors to an elderly activity centre found their online banking services to be difficult to use: the web site was seen as confusing, with too much irrelevant information and choices on the pages. One of them started a “data club” aimed at helping other elderly visitors with their Internet banking. Stark recruited some of the people frequently visiting the data club to join her in designing a new online banking solution. The design process consisted of seven meetings, and during these meetings the elderly participants suggested a design that was based on a very different logic from the current Internet banking solution. In the new “Easy Bank” banking solution the service mimics the tasks carried out by people going (in person) to the bank: they pay their bills or they want information about their bank account(s). Instead of presenting the bank customer with a virtual place where one can access a range of different bank services, the new “EasyBank” design presents the two most frequent activities: paying bills and getting information about the account, see Fig. 5.

hvordan vi designe noe som er lett å bruke ut fra å vite hva som er vanskelig å bruke?

-identifisere problemer m. bruk
-hva gjør ting vanskelig å bruke?

- dårlig design av system
- systemet i bruk
- andres handlinger

-gir ulike utfordringer
-kompetanse

- hva vi vet
- hvordan vi vet
- læring & avlæring

-hva er vanskelig sett fra bruker
-design for lett å bruke

coherent set of tasks left for the user instead of letting the technology decide what is automated [22].



Figure 5. A suggestion for an “easy online banking” made by a group of elderly users [31].

Making online banking easy by referring to well-known and established banking habits may make it easier to adopt the new way of doing banking. It seems that the logic of the current banking solution is grounded in how the bank sees the world rather than what bank customers may be interested in doing in the bank. One can argue that making the Internet bank a virtual “bank place” where lots of services can be activated is a more open solution that may serve all bank customers, however, for most of the less frequent users of

hvordan vi designe noe som er lett å bruke ut fra å vite hva som er vanskelig å bruke?

-identifisere problemer m. bruk
 -hva gjør ting vanskelig å bruke?

- dårlig design av system
- systemet i bruk
- andres handlinger

-gir ulike utfordringer

-kompetanse

- hva vi vet
- hvordan vi vet
- læring & avlæring

-hva er vanskelig sett fra bruker

-design for lett å bruke

«Du må vite hvor du skal lete»

Eldres bruk av nettbaserte tjenester

Karoline Helene Stark

Masteroppgave - Mai 2016



Kategori	Eksempler på bruk	Eksempel på ikke-bruk
Fysisk Bruk (tangible)	Beskrivelser av at det er vanskelig å trykke på iPaden, skjelvinger i fingrene, kjøp av i iPad fordi den bærbare pc-en er for tung til å ta med seg rundt, Holder telefonen med en hånd og trykker på den med motsatt pekefinger	Bruker ikke iPaden, Bruker ikke touch-pad Bruker ikke touch-skjerm Mangler nettverkskobling hjemme
Bruk av grensesnitt	Logger inn i nettbanken, leser avisen på nettbrett, spiller yatzy på smarttelefonen, forstå adressefeltet i nettleseren, lære seg nettbank, dele opp KID-nummeret	Bruker ikke touch-skjermen, skriveprogrammet på iPad, finner ikke appen som skal brukes
Erfaringer med bruk	Brukte pc på jobben, lærte å bruke pc på jobb, hatt hjemme pc-siden de kom, får hjelp av barnebarn når de er på besøk, tar med seg regningene til dataklubben for å få hjelp	Gikk sist over til epost fra faks, får hjelp til nye ting av barnebarn, Dataskrekk, føler man er for gammel, tenker at det er tungvint.

Fordi mesteparten av innholdet i datamaterialet var markert som «bruk» ønsket jeg derfor i neste gjennomgang av materialet å undersøke om den store kategorien som jeg kalte «bruk» besto av ulike former for bruk. Dette var tidkrevende, og det var vanskelig å finne kategorier som var distinkte nok. Først grupperte jeg bruk i kategoriene: *Vanskeligheter med bruk, bruk av internetttjenester, kroppslig bruk og erfaringer med bruk*. En gjennomgang til ga meg mer presise kategorier: «Fysisk bruk», «erfaringer med bruk», samt «ikke-bruk» som ble identifisert tidligere. Tabell 5 viser eksempler på de ulike brukskategoriene.

Kategori	Eksempler på bruk	Eksempler på ikke-bruk
Fysisk Bruk	Beskrivelser av at det er vanskelig å trykke på iPaden, skjelvinger i fingrene, kjøp av iPad fordi den bærbare pc-en er for tung til å ta med seg rundt, Holde telefonen med en hånd og trykke på den med motsatt pekefinger	Bruker ikke iPaden Bruker ikke touch-pad Bruker ikke touch-skjerm Mangler nettverkskobling hjemme
Bruk av grensesnitt	Logger inn i nettbanken, leser avisen på nettbrett, spiller yatzy på smarttelefonen, forstå adressefeltet i nettleieren, lære seg nettbank, dele opp KID-nummeret	Bruker ikke touch-skjermen, skriveprogrammet på iPad, finner ikke appen som skal brukes, mangler bruksanvisning
Erfaringer med bruk	Brukte pc på jobben, lærte å bruke pc på jobb, hatt hjemme pc-siden de kom, får hjelp av barnebarn når de er på besøk, tar med seg regningene til dataklubben for å få hjelp	Gikk sist over til epost fra faks, får hjelp til nye ting av barnebarn, Dataskrekk, føler man er for gammel, tenker at det er tungvint.

Tabell 5: Analyse 1 - Ulike kategorier av «bruk»

De tre brukskategoriene virket nyttige og mesteparten av teksten passet inn i en av de tre gruppene. Jeg syntes likevel analysen manglet en dimensjon, så jeg gikk gjennom materialet på nytt. Jeg kom frem til at jeg ønsket å finne ut mer om hvordan de ulike typene bruk ble omtalt, og kom etter hvert frem til at beskrivelser som enten problematisk og vanskelig, enkelt eller lett, eller at det måtte læres, eller at man ikke kan det gikk igjen. Derfor bestemte jeg meg for å lete etter innhold som passet med nøkkelordene *lett, vanskelig og lære*. Følgelig gikk jeg gjennom teksten og markerte passende innhold i henhold til disse nøkkelordene. Deretter forsøkte jeg å finne eksempler på nøkkelordene brukt sammen med de ulike formene bruk, med formål om å kunne si noe om hva som er lett og hva som er vanskelig og hva man må lære seg. Tabell 6 viser resultatet av dette arbeidet:



UiO : Institutt for informatikk
Det matematisk-naturvitenskapelige fakultet

«Du må vite hvor du skal lete»
Eldres bruk av nettbaserte tjenester

Karoline Helene Stark

Masteroppgave - Mai 2016



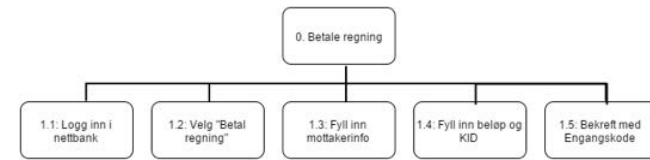
	Fysisk bruk	Bruk av grensesnitt	Erfaringer med bruk	Ikke-bruk
Lett	Å bruke mus, Tv, radio, stasjonær pc, Snakke i telefonen, doro-telefon, å ta med iPad i veska, å ha passordet skrevet ned	Skype, værmelding, store knapper, nettbanken, iPad, avtalegiro	Når man kan det, har brukt pc på jobb, sitte i ro og mak, brevgiro,	
Vanskelig	Å bruke touchpad Å skrive melding på lite tastatur, Lukke programmer ved å dra ned vinduet med touch i W8, liten skjerm, å bære bærbar pc, skjelver på fingrene, , å sette papir i printern	Når man står fast uten hjelp, Finne krysset for å lukke programmer, finne riktig vindu, å stoppe nyhetsvarsler, KID-numre, å finne bildene på pcen, mappestruktur, når tingene er plassert langt unna hverandre	Når man ikke kan det, smarttelefonen, å huske passord	Å bruke touchpad Å skrive melding, huske brukernavn og passord,
Lære	Må lære meg å trykke, må lære meg å logge på internett hjemme,	Man må lære seg det, vanskelig å lære når det går for fort, tar tid å lære, huske hva man har lært, Må lære meg det først, må lære meg digipost	Å bruke pc på jobb, å skrive meldinger, få hjelp av sønnen, får hjelp til å lære i dataklubben eller i banken	For g lære datas tung noe r

Hierarkisk oppgaveanalyse av innlogging i nettbanken og betale regning

1.0: Generelt om innlogging i nettbank og betaling av regninger

En generell modell på hvordan regningsbetaling foregår:

- 1.0 Betale regning
- 1.1 Logg inn i nettbank
- 1.2 Velg "betal regning" i meny
- 1.3 fyll inn mottakerinfo
- 1.4 Fyll inn beløp og KID
- 1.5 Bekreft med engangskode



Figur 1: Grafisk fremstilling av HTA av oppgaven "Å betale en Regning"

1.1: Innlogging i nettbanken i DNB

1.0: Innlogging i DNBs Nettbank

- 1.1: Tast inn fødselsnummer og trykk «Logg inn»
- 1.2: Velg innloggingsmetode: (BankID med kodebrikke velges)

Kritikkfase	Drømmefase	Implementasjonsfase
Vanskelig å få oversikt Vanskelig å finne frem Vanskelig å finne brev Vanskelig at bankene er ulike Å lete i en liste (meny)	Bankene burde ha ett system for innlogging Bankene burde ha samme nettbank Ha faste knapper å gå inn på, alt bør synes med en gang.	Betale regning er primæroppgaven, Må ha med: Betale, saldo, kontoutskrift, overføre, eFaktura og avtalegiro

Tabell 11: FW-faser for «Startside»

Filling the Holes with Workarounds:
Watching Maps Work in the Terrain

Master thesis

Wilhelm Arthur Sandberg Damsleth

Spring 2013



Grounded Theory

Methods and Subjects

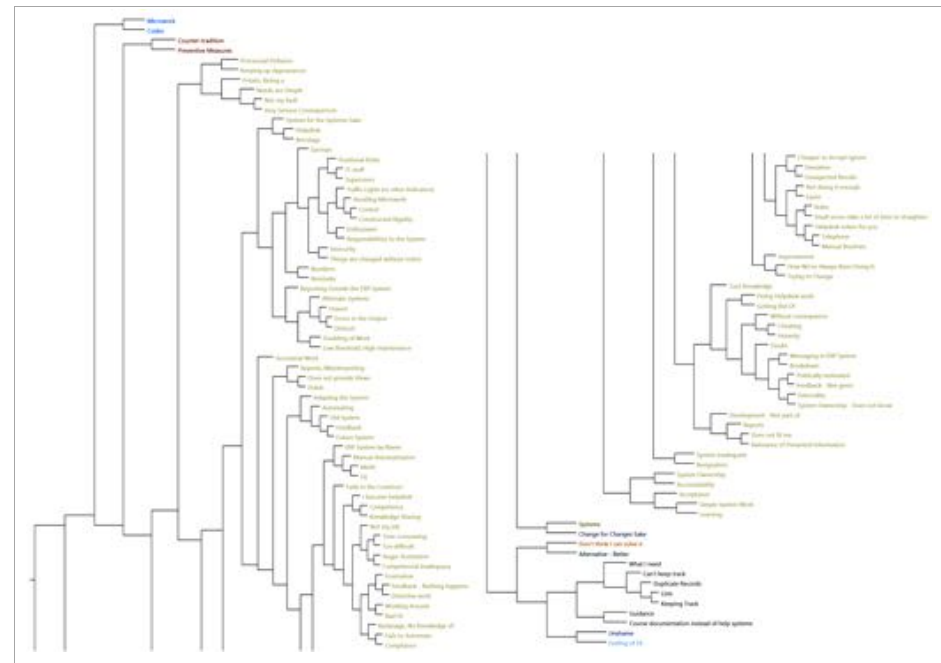


Figure 2.3 The codes developed after analyzing interviews 7 and 8, as clustered by the application NVivo. A subsection is solely needed. The dendrogram has been split in two to facilitate the page layout.

Grounded Theory

Methods and Subjects

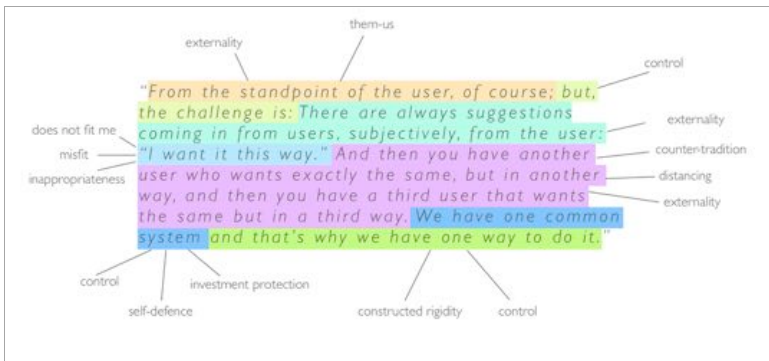
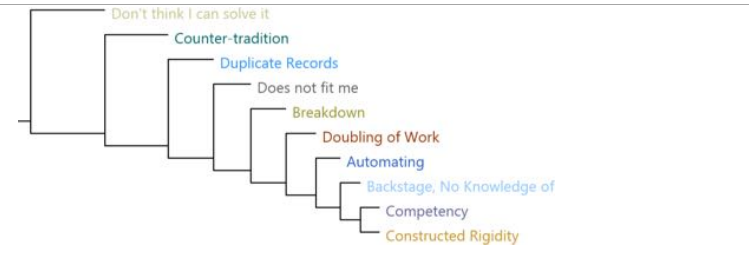


Figure 2.2 An example of codes applied to an interview excerpt. Same data as Table 2.2.



A random selection of codes for analysis yields a very straightforwardly structured dendrogram.

UiO : Institutt for informatikk
Det matematisk-naturvitenskapelige fakultet

«Hæ? Hvorfor har ingen fortalt meg dette?»

En analyse av IT-løsningene ved UiO i et
tjenestedesignperspektiv

Masteroppgave - Martine Birketvedt Eklund og Seline Tomt - 2016-08





Tone Bratteteig, in1060: 12/3 2018

kvalitet i kvalitative studier

Marshall & Rossman:

- troverdighet (credibility, believability) i stedet for indre validitet
- overførbarhet (transferability) i stedet for ytre validitet eller generalisering
- avhengighet (dependability)
- bekreftbarhet (confirmability) i stedet for objektivitet

kildebruk

bygge på andres arbeid

-begreper, teori (forklaringer)

-liknende studier

-eksempler

Husk at sitater skal ha henvisning med sidetall

Husk at å kopiere uten å referere er plagiat og regnes som juks

kritisk refleksjon

refleksjon

(*flechir*: snu/bøye tilbake til seg selv) - å kaste tilbake, gjenskinn
dvs. tenke om igjen, går gjennom noe på nytt, re-vurderer

Forutsetning for å lære og forbedre seg (Schön)

-reflection-in-action

-reflection-on-action

Kritisk: stille spørsmåltegn ved vedtatte sannheter

-hvorfors ting er blitt som de er & hvem tjener på det? (makt)

-hvordan kan ting bli annerledes / bedre?