THESIS FOR THE DEGREE OF LICENTIATE OF ENGINEERING

User Centered Design Methods must also be User Centered: A Single Voice from the Field

A Study of User Centered Design in Practice

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While the actual process of reading and writing usually is the work of the individual, a thesis is far from the work of a sole person: Much support is needed, but also overbearance. People in the middle of thesis writing might suddenly be lost to the outside world, a condition signified by glassy eyes and incoherent answers to normal conversation, which does not earn the budding scientist any social credits. Other similar shortcomings include those of not always, or perhaps even seldomly, joining the family in the usual tasks and cosiness of family life. At work, physical and psychological absence might be observed at regular intervals.

All of this requires understanding, easy forgiveness and active support.

In some order of randomness, I would like to thank Chalmers Technical University, notably Professors Rutgersson and Larsson of the Shipping and Marine Technology Department, who took a chance on a middle-aged naval architect, and allowed him to start studying again.

Any and all members of the Usability Team that performed the work described in this thesis as 'Project Alpha' should recognize that they actually did the work – I'm just reporting. I am sincerely grateful to each and every one of you, for our discussions, arguments, incidents and, noteworthy, accomplishments: Through your professionalism and good spirits you demonstrated that User Centered Design can be done in the marine industry, something which is a first, according to my best knowledge. Without you, there would have been no data for this work.

I would also like to acknowledge the tireless efforts of Mr. Brian Sherwood-Jones, with genuine gratitude – and a request for forgiveness. Brian is my co-supervisor, a role that he fulfills pleasantly and with great energy. The latter is in particular expressed by a constant stream of pointers to relevant information in cyberspace, in a volume I am not always able to handle. Much less, and here enters the plea for forgiveness, am I able to revert with responses, or indeed express the gratefulness I feel for the work you do.

My CEO and closest colleague, Mr. Kjeld Dittmann, deserves a particular acknowledgement. Not only did he permit my enrollment as an industrial doctorate student, suspecting – knowing – that this would have a price at various levels; he has actively supported me throughout the process. There has apparently not been a single flash of regret, but simply an enduring backing and encouragement. Without that, obviously, I would have gotten nowhere. Thank you.

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and my wife Bente. Luckily, it is not a competition, so I do not have to pass judgment on the absolute level of hardship, but there is absolutely no doubt that this thesis would never have happened without the significant help, kindness, understanding and wholehearted support of either of these two ladies.

Margareta is the best supervisor you can ask for. She will patiently read anything and everything you write, and will almost always find at least a glimmer of light in the academic darkness of your mind and your scribble, resulting in genuine encouragement. She will guide you when you need it, but will leave you to work out puzzles on your own when that is your preference – but she will in any case keep you on course, never forgetting the larger picture and the aim of being a student. She will not treat you like one, though, but will work with you as an equal.

Bente has a very busy schedule as it is, but did in any case choose to support me in this folly, paying herself with more chores, longer hours, and a husband that is often distracted – this is where the glassy eyes comes in. Nevertheless, she has given me the room to do this work, in time and space, with good moods and usually with patience, but never faltering and always with tons of encouragement.

'Thank you' can be said in many ways, from the meaningless 'Thank you' to the grocer, when you receive you change, to the all-encompassing, totally serious and deeply heartfelt 'Thank you'.

The 'Thank you' to both of you is of the latter kind.

ESP

THE JOURNEYMAN

The word 'journeyman' comes from the French word *journée*, meaning the period of one day; this refers to their right to charge a fee for each day's work. They would normally be employed by a master craftsman but would live apart and might have a family of their own. A journeyman could not employ others. In contrast, an apprentice would be bound to a master, usually for a fixed term of seven years, and lived with the master as a member of the household, receiving most or all of their compensation in terms of room and board.

In parts of Europe, as in later medieval Germany, spending time as a journeyman (*Geselle*), moving from one town to another to gain experience of different workshops, was an important part of the training of an aspirant master. Carpenters in Germany have retained the tradition of traveling journeymen even today, although only a small minority still practice it.

The terms *jack* and *knave* are sometimes used as informal words for journeyman. Hence 'jack of all trades, master of none' — someone who is educated in several fields of trade, but is not yet skilled enough in any to set up their own workshop as a master.

(Wikipedia, 2009).

THE TILLERMAN

Bring tea for the Tillerman
Steak for the sun
Wine for the women who made the rain come
Seagulls sing your hearts away
'Cause while the sinners sin, the children play
Oh Lord how they play and play
For that happy day, for that happy day

(Stevens, 1970)

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PROLOGUE

All good fairy-tales start with 'Once upon a time…'

While not being a fairy-tale, this thesis nevertheless has its roots a good way back in my past. I was lucky enough to be introduced to usability and User Centered Design (UCD) in the early and mid-1990'ies, concurrently with Nielsen's (1993) pioneer work and the inception of ISO 13407 'Human Centered Design Processes of Interactive Systems' (1999). Being member of a group of very talented and enthusiastic people in the ATOMOS II project (1999), I participated in the preparation of a maritime-specific derivate of ISO 13407 titled 'Conceptual Standard for SCC[1] Design (Including HMI)' (1998), which includes and elaborates the user centered life cycle also found in the general standard.

As such, Human Factors (HF) in general, and usability and UCD in particular, has become a kind of second nature to me. Being a Naval Architect by training, and having had my daily work in as diverse places as ship design offices, maritime research institutions and manufacturers of marine equipment and marine electronics, instruments and software, I have promoted human factors issues whenever the chance has presented itself.

It is important to note that in any of these contexts, I have never been met with anything but genuine interest in, and sympathy for, the concept of usability. While being quite satisfying, this is however perhaps not very surprising: Who would, after all, advocate against designing new marine equipment or new ships to be less than suitable, or even outright unsuitable, for the intended purpose?

In any case, this interest and sympathy has almost invariably been at the personal level, and experientially, something happens with this sincere attitude during the transit from the personal to the corporate level in the maritime industry: it seems to evaporate. The obvious result is that nothing much happens towards achieving good usability at an industrial level; no industrial usability lighthouses appear and stand out to be appreciated by a wider audience. Consequentially, the maritime industry conduct the daily business in what could appear to be blissful oblivion of the potentially huge benefits associated with the provision of safe, effective, efficient and satisfactory working conditions on the ships. And as Lützhöft (2004) notes, there is indeed room for improvement in the ship's bridges, just as she and Lundh notes

1. SCC: Ship Control Centre

that the same thing goes for the engine control rooms (Lützhöft & Lundh, 2009).

I cannot help myself in asking 'Why'?

Of course, maritime HF may not yet be backed by the kind of objective, economically oriented evidence that counts in the corporate boardrooms. There may also, in this case as elsewhere in the maritime industry, be a complicated issue of monetary cost meeting, or missing, the corresponding benefit: In a domain with so many loosely coupled stakeholders and interests, an economic investment into the field of usability may have a difficulty in providing the expected economic gain directly to the investor, rather than to another stakeholder. Furthermore, such other stakeholders, including the ship yards, the ship designers and the equipment manufacturers, does usually not have a direct stake in the financial performance of individual ships, and hence may have a tendency of shying away from cost-increasing issues like usability, in order to reduce first cost to the most attractive and competitive level.

Knowing and considering that brilliant researchers are making inquiries into these aspects, striving to produce the much sought-for quantitative evidence of the favorable effects of good usability, I'm happy to leave this particular aspect alone. Instead, I concern myself with other potential explanations for the 'HF appreciation paradox' between individuals and organizations, and the mysterious change that appear to happen when sympatric HF considerations elevate towards the higher echelon decision makers.

Is it, after all, simply so that the basic idea of usability, the fundamental concept of designing systems that are safe, effective, efficient and satisfactory to use, has a serious flaw which only becomes obvious when considered at a corporate level?

Or could it be that the Human Factors science is poorly understood by persons such as business managers, engineers and software developers, who, having been brought up in traditions different from the social sciences, find it to be anecdotal and unconvincing, and hence of little interest or importance?

Or could it be a combination of such factors?

Or?

Since I utterly fail in seeing the downside of systems and installations with good usability, whether regarded from a moral, philosophical or corporate viewing angle, I have speculated about these as well as other potential causes, and have tried to unearth new or novel reasons that could be potential explanations.

One morning something dawned on me: Maybe one of the primary barriers to good usability is not conceptual, but on a more

practical level: Maybe usability is simply much harder to achieve than hereto assumed, when considered from a common sense point of view? Maybe the process of achieving good usability is a deterrent in itself? Could it be that the means to achieve usability, which usually involves User Centered Design, are similarly hard to come by, complicated to understand, given the typical background of potential users, and cumbersome to apply, for those who have to do so?

In a word, maybe User Centered Design methodologies are not very usable themselves?

My research starts here.

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CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

The present study concerns itself with the usability of the user centered design methodology, as this is defined by ISO 9241-210 (ISO9241-210, 2009) and other international standards:

> "[usability is the] extent to which a product can be used by specified users to achieve specified goals with *effectiveness*, *efficiency* and *satisfaction* in a specified context of use" (authors emphasis) (ISO9241-11, 1998; ISO9241-210, 2009, p. 3; ISO13407, 1999, p. 1),

From the outset of the study, it is speculated that low usability of the user centered design method could be a barrier in the context of the limited application this method appears to have within the maritime industry, and the research question posed is formulated as

> 'Is the application of UCD according to ISO 9241-210 effective, efficient, satisfactory and easy to learn for those responsible for managing hardware and software design and redesign processes?'

I have sought the answer to the research question by way of practice, and have undertaken three user centered design projects, in a fully industrial context, in what I believe to be accordance to ISO 9241-210 (2009), as far as practically possible.

During the execution of these three projects, I have used the scientific principles of Reflective Practice (Schön, 1983), augmented with the budding tradition of Analytic Autoethnography (Anderson, 2006), to collect data, the subject being 'those responsible for managing…software design': myself, and my actions. Throughout that period, which lasted two years, I have kept a research diary, and from the more than 85.000 words, illustrations, files, presentations and other evidence, I have constructed six tales of the field, in the narrative tradition primarily described by van Maanen (1988), Stringer (2007), Anderson (2006) and Schön (1983), adding up to what I suggest contains the 'thickness' described by Geertz (1983).

With regard to validity and reliability, I have developed the appropriate concepts from Action Research (Herr & Anderson, 2005) and Ethnography (Fishman, 1999; Hammersley, 1992; Lincoln & Guba, 1985; Lützhöft, Nyce, & Petersen, 2010) to a level where I suggest they cover self-study. The thinking of Anderson (2006), Feldman (Feldman, 2003, 2007), Moon (2004), Bullough and Pinnegar (2001) and Winter

(2002) have been instrumental in this process, which culminates in a synthesis of validity and quality criteria that I suggest are applied to my own work – an application, however, I suggest is undertaken by the reader of this thesis, due to its fundamentally subjective nature.

Throughout the thesis it is stressed that the findings are believed to have local validity, but local validity only: they are not readily transferable, or if they are, the argument has neither been attempted nor presented. The research undertaken shows, within the stated validity space, that the user centered method as described by for instance ISO 9241-210 (2009) is effective, and does describe a process which leads to improved usability.

It however also shows that the learnability of the user centered design method leaves something to be desired, and furthermore, that the satisfaction of doing user centered design is lower than one could hope for.

It appears finally, in my view, that a number of issues are underrated in the current descriptions of user centered design:

- The determination required to undertake and complete UCD;
- The importance of achieving buy-in amongst all stakeholders;
- The establishment of the faith in the iterative process of UCD;
- The quest for consensus between team members and within the implementing organization;
- The recognition that doing UCD is more than a development process, but appears to be a full-blown organizational change process;
- The critical importance of creating and 'jelling' an effective, skilled and capable multidisciplinary team.

Keywords: Usability, User Centered Design, Reflective Practice, Autoethnography, Validity

USER CENTERED DESIGN METHODS

MUST ALSO BE USABLE

'A SINGLE VOICE FROM THE FIELD'

Intent

The intent of this thesis is to inform about three projects that applied user centered design according to ISO 13407 (1999) and ISO 9241-210 (2009), and the local knowledge that springs from this application. The title of the thesis is intended to stress the local focus, acknowledging that the fieldwork is reported as seen through one set of eyes only, and that only one voice is speaking. The thesis is not intended to generalize, or to claim transferability, but while it is of a stand-alone nature, it is nevertheless also meant as a foundation for future research, with that precise aim in mind.

It is a social sciences thesis, and the methods used, the writing style and the considerations about validity and reliability reflect that.

Thesis Structure

Conventionally, a thesis more or less follows the structure of 'Literature Review', 'Problem Statement', 'Method', 'Results' and 'Discussion' (Rudestam & Newton, 2007).

In the light of the methodology used in this thesis (Action Research, Reflective Practice and Analytical Autoethnography, as per the chapter starting on page 111), I have chosen to use a variant of this theme, primarily inspired by Stringer (2007), and as commented on by Coghlan and Brannick (2005)[2]. It should be noted that such a departure from the traditional thesis layout is common within the

2. The dating of these references appears inconsistent. However, Coghlan and Brannick (2005) comment on the second edition of Stringer's (2007) book on Action Research, while I in general refer to the third edition.

referenced research traditions, and especially within action research (Coghlan & Brannick, 2005; McNiff & Whitehead, 2006; Stringer, 2007).

The thesis structure thus includes the following main chapters:

- Foundation
- Research Sphere: the Usability of User Centered Design
- Pre-Knowledge
- Research Process
- Tales and Reflections
- Discussion: Results
- Methodology, Validity and Reliability
- Discussion: Scope, Methodology, Validity and Reliability
- Future Work
- Conclusion

The departure from tradition is motivated by Stringer (2007), who is concerned with the traditional five-chapter structure, arguing that it often inhibits the clear and adequate representation of people's experiences and perspectives. Elaborating the issue, he advocates that in traditional theses

> "the voices of the principal stakeholders have become muted and sometimes lost in the academic or bureaucratic issues that tend to predominate in reports of this variety" (Stringer, 2007, p. 184).

Considering that the results in this thesis primarily, or perhaps singularly, build on narrative and accounts of experiences in the field, the adapted structure is justifiable.

Reader's Notes

I appreciate that the appeal of the various chapters in this thesis will differ from reader to reader, and suggest that they can be read with varying emphasis. I however recommend that they are read in the order of appearance.

With regard to contents and style, the chapters on 'Research Sphere: the Usability of User Centered Design', 'Pre-Knowledge' and 'Research Process' are there for 'housekeeping' reasons: they establish the research question, my background and my initial knowledge base,

and the mechanics of the research undertaken. They are unremarkable from a stylistic point of view. In combination with the 'Prologue' and the chapter on 'Foundation' (see below for a further discussion of this chapter), they also comprise the 'Is that so' part of this thesis.

The 'So what' part of the thesis is constituted by the chapter called 'Tales and Reflections' (see an elaborate description below) and the chapter 'Discussion: Results', which captures the stable trends from the experiences in the field. While the former chapter stylistically differs from mainstream science, the latter is kept in the traditional form.

Finally, combining to form the 'What's next' part of the thesis, and keeping to the traditional academic writing style for the simple reason that this form is very effective and useful when it comes to present arguments such as those contained in these chapters, are the chapters on 'Discussion: Scope, Methodology, Validity and Reliability', Future Work' and 'Conclusion'. Unremarkably, they contain what their titles suggest.

The chapter on 'Methodology, Validity and Reliability' describes my concerns on methodology, in the light of trying to match a method to reality, rather than, as usual, matching reality to a method through careful research design. It moves on to describe what really happened, and ends up with my considerations on validity and reliability. In complete agreement with Polkinghorne (2003a), who describes that the purpose of any scientific inquiry is to find the 'truth', I consider the latter to be a pivot point of the thesis. If validity and reliability cannot be demonstrated, there is simply no foundation for further work – at least not along the lines of the research reported here.

About the 'Foundations' Chapter

The chapter called 'Foundation' provides, in an intentionally popular way, a backdrop for the study field and the problems one is likely to encounter in this respect. It is intended to support the uninitiated in rapidly becoming familiar with the context of the research, and to anticipate, as well as to appreciate, the experiences reported.

The chapter is written mostly in the tradition of a short story, borrowing from Gamow and Stannard (1999) and DeMarco (1997) – the reason being that I am impressed with their easy but very effective conveyance of complex knowledge using this style, and their particular gallery of characters. I am hence reusing the persona of Mr. Tompkins,

who originally was made famous by the renowned physicist Gamow. In Gamow's incarnation, Mr. Tompkins listened to lectures in physics, which addressed major issues within that science. Invariably, Mr. Tompkins fell asleep during the lectures, and dreamt about the phenomena being explained, but in such a way that laypersons could easier understand the issues involved. A well-known example is Mr. Tompkins' visit to a place where the speed of light is reduced to 20 miles per hour, where Mr. Tompkins sees the elongation or compression of moving objects, and experiences how time and motion depends on each other (Gamow & Stannard, 1999).

DeMarco revives Mr. Tompkins, along with a new gallery of persons, in a thrilling story about software development (1997). In DeMarco's universe, Mr. Tompkins is kidnapped to lead a very large software project in the fictional country of Morovia.'The Deadline' (DeMarco, 1997), as it is named, follows this process as the main story, and like in Gamow's stories about Mr. Tompkins, there is a recurring theme. While a bit less obvious that in Gamow's incarnation, DeMarco's Mr. Tompkins usually experiences a novel problem or issue, and very shortly after that, happens to meet with a world famous authority on the subject in question. This expert, usually in a narrative fashion, lays out the explanation in brief and understandable terms, upon which he usually departs. Each chapter is then concluded by Mr. Tompkins summing up the learning from the episodes in the form of making bullet point notes to his diary, as 'take-away' messages.

In my case, I have the challenge of providing a reasonably useful background on User Centered Design, primarily as this is described by ISO 13407 (1999), or subsequently by ISO 9241-210 (2009). This subject could easily be a very dry and unexciting affair, unless advantage is taken of the postmodern freedom in academic writing advocated by Richardson and Pierre (2005). By doing it in the style chosen, I hope the medicine will go down more easily.

About the Chapter on 'Tales and Reflections'

The chapter called 'Tales and Reflections' is the main story, and the one that provides the data for the subsequent part of the thesis. I feel it is important that this chapter stands out, and that the lessons learned and the experiences gained are 'uncontaminated' by theory at the time of telling. If it was the other way around, any reader might well

already be influenced by my understanding and my views, rather than freely being able to form her or his own impression.

The tales are overarchingly written in stylistic traditions that go beyond the realist ethnographical style (Maanen, 1988; Sparkes, 2002), and they concentrate on the unexpected, or the surprising, which is the core of reflective practice (Schön, 1983). The tale of Project Gamma, for instance, is written the mold of the impressionist tale, which retains the focus of the unforeseen: "Impressionist tales are not about what usually happens but about what rarely happens" (Maanen, 1988, p. 102). "The form of an impressionist tale is dramatic recall", van Maanen (1988, p. 103) continues, and observes that

> "Events are recounted roughly in the order in which they are said to have occurred and carry with them all the odds and ends that are associated with the remembered events. The idea is to draw an audience into an unfamiliar story world and allow it, as far as possible, to see, hear, and feel as the fieldworker saw, heard and felt. Such tales seek to imaginatively place the audience in the field work situation…" (Maanen, 1988, p. 103)

In anticipation of the methodological discussion that follows later in this thesis (see the section on 'Visible and Active Researcher in the Text' on page 128), I suggest that the impressionistic style fulfills the requirements set forth by analytic autoethnography, which serves as an important part of my methodology. In that context, Anderson (2006) calls for the visibility and presence of the writer, by noting that

> "The researcher's own feelings and experiences are incorporated into the story and considered as vital data for understanding the social world being observed" (2006, p. 384).

It is tempting to suggest that this kind of narrative, which evocatively is providing an insight into the fieldworker, is important to the tradition of reflective practice. With reference to Schön (1983) and Geertz (1983), it is my argument that the rich representation, close to the data, is portraying the researcher with an openness and insight that "helps the reader to walk for a while in the writer's or artist's world, sharing his enterprises and methods, seeing as he sees" (Schön, 1983, p. 314), and which provides input for an assertorial argument of quality (Lützhöft, et al., 2010). The requirement to this kind of transparency is, as it transpires from the discussion of methodological concerns (see

page 139 and onwards), a view that is also supported by Bullough and Pinnegar (2001), as well as Feldman (2003).

FOUNDATION

Readers Note

Knowledge of UCD, and thus ISO 13407, is a prerequisite to appreciate the work that is reported in the thesis, and the conveyance of such baseline knowledge is the purpose of the short story contained in this chapter. The story can be read as just a story, without bothering about the notes, or conversely, by consulting them at will.

Mr. Tompkins and the Common Sense[1] of Usability

Prelude

Even though it was still early in the morning, the sun was already shining warmly, high in the clear, blue Bordurian[2] sky. On his way to the office shortly after dawn, Mr. Tompkins had heard the weather forecast, and it sounded like it was going to be yet another beautiful day in Fidelz, the suburban district on the outskirts of the Capital, where the software development branch of the Company was located.

In his ample office on the 5th floor of the building, Mr. Tompkins did a quick survey of his desk, and decided that there was nothing there that could destroy the promises of a good day. Of course, there were tons of things he needed to attend to, especially the pile decorated with the (virtual) blinking sign of 'really-soon-now', but even that did not contain any real dynamite. Emails received on his GrapeFruit[3] hand-held device gave the same impression: The day was going to be busy, certainly, but no immediate crises loomed on the horizon.

In particular, Mr. Tompkins felt sure that the progress meeting with the software development team-leaders at 10:00 would confirm his gut-feeling: The ongoing development of their main application, Zyklone Gold v.3, went according to plan, more or less. At least, the performance and progress was better than par for the course, and it seemed entirely feasible that they would finish on time, according to overall development schedule.

But then, Mr. Tompkins argued with himself, how could it go really wrong? They were evolving an earlier product version, and the development was following the time-honoured Waterfall model, which

provided predictability and reduced the risk often experienced in software development[4]. He had a good, experienced development team, where many of the key members had 'been there' before, having participated in the development of many of the earlier versions. There were even still people in the organization who had participated when they went from the traditional analogue Quibber[5] to the first fully digital systems, and the Company was, arguably, the world leading supplier of Quibberling applications. With the introduction of the Zyklone series, where they managed to switch from cumbersome, dedicated hardware to the PC platform, they had rather surprised the competition, and had managed to secure their position in the forefront of the Quibber business. Mr. Tompkins could not help smiling a little satisfied smile: With Zyklone Gold v.3, they just might sandbag the competition once again. Targeted at the professional market, Zyklone Gold v.3 supported the latest version of the operating system GoogHole, and it would fully implement all the advanced, windowing and touch-sensitive functions available there. That, in combination with the 56 new functions his development team had developed in the deepest secret, would once again move the standards for Quibber[6].

Leaning back in his desk chair, balancing his coffee-mug on the top of his rather full figure, Mr. Tompkins lost himself into the satisfied vision of seeing the faces of his counterparts, when they finally realized what was going on. Especially Mr. Schmuck from…

It turned out that Mr. Tompkins was wrong on a number of counts: First of all, in spite of the nice weather and the deceivingly calm outlook, outdoors and indoors, his day could in fact be ruined. The full support of GoogHole might not be the final answer to the future. The 56 new functions invented in secret might not be the end to all Quibberling development. And balancing his coffee-mug on the top of his belly could indeed have disastrous consequences. Especially surprising was perhaps the point that all of these sandcastles could be swept away by the same, single wave, in a flash.

It started with the coffee-mug, which tumbled from the top of his belly, soaking his nice white shirt, and his chair, when Delectia, Mr. Tompkins very pretty, French-speaking assistant, almost kicked his door open with an unheard-of bang. Needless to say, Mr. Tompkins was flabbergasted, but so was Delectia obviously. She was quite pale under her careful make-up, and the corners of her mouth had a nervous tic to them that he had never seen before. Most telling, however, Delectia was for once almost speechless, and only managed to stutter

"Le Professeur…he…here…pour vous…"

Disentangling himself from his chair, his coffee and trying to recover a bit of his usual composure simultaneously, Mr. Tompkins realized that Delectia was holding a piece of paper in her hand. It looked like an old-fashioned telegram. Mr. Tompkins mood went south at alarming speed, especially when he managed to comprehend Delectia's mumbling. He knew of only one person in the universe who still used telegrams: TEACHER, The Elevated, All-knowing Commander of Heading, Effort and Resources, the mysterious, seldomly-seen owner and CEO of the Company – and since the Company provided jobs and security to half of the population of Borduria, TEACHER was many times more influential than the Bordurian King, the Prime Minister and the entire Bordurian cabinet, combined. TEACHERs word was law, no more, no less. This was bound to be very, very bad news: One lived best when one lived quietly, not calling TEACHERs attention onto oneself.

Finally getting upright, Mr. Tompkins held out his hand, now slightly shaking, towards Delectia, who passed him the telegram.

> 'IMPLEMENT USER CENTERED DESIGN IN ZYKLONE STOP. DEVELOPMENT DEADLINE UNCHANGED STOP. TEACHER ENDS.'

"User-centered what...?" Mr. Tompkins managed to whisper...

Gathering part of his wits with great difficulty, Mr. Tompkins decided he did not understand a thing. First and foremost, he needed information, to make meaning of this strange telegram. Even though they had never discussed it, Mr. Tompkins had for a long time suspected that Delectia had connections closer to TEACHER than the average citizen in Borduria, a lifeline he now decided to make use of.

"Delectia, is there any way you might find out what this is all about? And cancel the 10 o'clock Progress Meeting. In fact, cancel all my appointments today. I have to get a grip on this."

Evidently calmed somewhat by Mr. Tompkins taking command of the situation, Delectia retired to the front office with a weak smile, a more normal color to her face and a 'Oui, Monseiur, naturellement', and closed the door behind her, this time in her usual quiet fashion.

Mr. Tompkins made a quick survey of the situation. His shirt was ruined, but that could not be helped. The carpet was stained, but thanks to the Bordurian Ministry of Supply, and their default choice of color, the stains would eventually fade to become unnoticeable. The message from TEACHER was however incomprehensible,

unintelligible, completely unexpected, and downright very bad news. Mopping up the remaining drops of coffee from his chair, Mr. Tompkins sat down, turned on his PC, and went straight to Google. Typing 'user centered design' gave him the Wikipedia entry at the top of the list:

> "In broad terms, user-centered design (UCD) is a *design philosophy* and a process in which the needs, wants, and limitations of the end user of an *interface* or *document* are given extensive attention at each stage of the design process. User-centered design can be characterized as a multi-stage problem solving process that not only requires designers to analyze and foresee how users are likely to use an interface, but to test the validity of their assumptions with regards to user behavior in real world tests with actual users. Such testing is necessary as it is often very difficult for the designers of an interface to understand intuitively what a first-time user of their design experiences, and what each user's *learning curve* may look like. The chief difference from other interface design philosophies is that user-centered design tries to optimize the user interface around how people can, want, or need to work, rather than forcing the users to change how they work to accommodate the system or function" (Wikipedia, 2008).

Reading onwards, Mr. Tompkins quickly came to another hint:

> "All these approaches follow the ISO standard Human-centered design processes for interactive systems (ISO 13407 Model, 1999)" (Wikipedia, 2008).

Usually decisive and quick-witted, Mr. Tompkins did not know what to do with this. It seemed like nonsense. Zyklone had more than a million users worldwide. How on Earth should he get to ask a million people about their needs, wants and limitations? Furthermore, his experts in Quibberling for sure had the ultimate knowledge? After all, they had practically invented digital Quibberling, and had had huge success in the market[7]. What could possibly be improved on Zyklone – apart from the full support of GoogHole they already had in the pipeline, and the brilliant new functions, cleverly invented by his staff? If his team did not know what was wanted in Quibberling, who did?[8]

Mr. Tompkins thoughts were interrupted by Delectia, who knocked on the door, and entered.

"Monsieur, I have talked to my cousin Ravisiha, who is working as a secretary for TEACHERs personal assistant. Yesterday, TEACHER had guests from abroad. She did not really catch the names, but thinks it was a Professor Northman, along with a Dr. Nilsson. There was a third person there as well, a Dr. David O. Good[9]. All three gentlemen visited TEACHER for about an hour, and then left. Professor Northman and Dr. Nilsson went straight to the airport, and boarded a private jet bound for Syldavia[10]. Dr. Good, however, was driven to the Hotel Negresky[11], across from the town hall. My cousin thinks he is still there."

Delectia hesitated a bit, before she continued.

"After these people left, there as a loud argument in TEACHERS office, between TEACHER himself and the Minister of Development. Ravisiha says that the Minster stormed out of the office at the end, yelling 'Preposterous! Banal! Nothing but common sense. Waste of time!' I told Ravisiha about the telegram you got, and she believes there is a connection."

"Bad", thought Mr. Tompkins, "Very bad. Worse than what I thought. These people have filled TEACHERs head with this nonsense about what users do and what users need, and now I have to find a way of wriggling out of this mess, without jeopardizing the development schedule."

"Delectia, check if this Dr. Good is still in the Negresky. If he is, persuade him to visit us immediately. Get him here, no matter what. I need to talk to him urgently. It will take the entire day, and I don't want to be disturbed. Just get him here, get us a bucketful of coffee and cookies, and then leave us alone."

Change

Fifty minutes later, Delectia knocked on Mr. Tompkins door.

"Monsieur Tomkin'", Delectia said in her charming French accent, having trouble with the 's' at the end of Mr. Tompkins' name, "Monsieur Le Docteur D.O. Good is here to see you."

A man of medium height entered Mr. Tompkins office. He was beaded but otherwise rather bald, pot-bellied, and had a permanent bend in his back from too much desk-work and too much studying. He was informally dressed in a short sleeved sports shirt, cotton slacks and black moccasins, and appeared not to notice Mr. Tompkins heavily coffee-stained shirt. He however had honest and interested blue eyes

peering over the rim of his reading glasses, which he appeared to wear also when walking round.

The introductions rapidly over, Dr. Good asked

"I understand you wanted to see me urgently? This has to do with user centered design? Is there a connection with the meeting my associates and myself had yesterday with TEACHER?"

"Very much so, I'm afraid" said Mr. Tompkins, looking decidedly unhappy.

"Did anyone inform you about the purpose of the meeting yesterday", asked Dr. Good, attempting to feel his way ahead in what appeared to be barely navigable waters.

"Not at all"

"Hm. Well, you see, it appears that TEACHER recently stumbled over a rather new book about Human-System integration from the National Research Council[12]. Among other things, this book is arguing five critical principles to successful system development."

Dr. Good counted using his fingers in the air.

"First, 'Stakeholder satisficing', he said. Next, you have 'Incremental growth of system definition and stakeholder commitment' and 'Iterative system definition and development'. As principle number 4 they have 'Concurrent system definition and development' and finally, there is 'Risk management – risk-driven activity levels and anchor point milestones.'"[13]

"Having read most of the book, TEACHER then called my director, Professor Northman, for a further discussion, and this lead to the meeting yesterday. There, the talk quickly turned to User Centered Design, since that approach is a framework capable of fulfilling the principles I just mentioned", Dr. Good elaborated. He continued

"Did you know, that according to a report McConnell quotes in his book on how to tame wild software schedules[14], the single most important success factor is user involvement?"

This was clearly not the right approach. To Dr. Good, Mr. Tompkins now looked even more unhappy than before. There had also been a strange light in his eyes while Dr. Good recounted the five principles from the book on Human-Systems integration. Far from unexpected, given the raising storm signs, Mr. Tompkins responded with noticeable coolness.

"This may be so, but that is of little immediate consequence. I have a software system to develop and deliver according to a very rigid schedule. Everything is well specified, and progress is going according to plan: this system will be available for launch on the date promised, and

with all the specified features in place, tested and finalized. There will be no budget overruns, either. My only problem right now is that I have to find a practical way of taking account of this user whim, without destroying all the real work going on in the development department."[15]

Dr. Good looked silently at him for a little while, and then asked

"Do you Quibber?"

This question took Mr. Tompkins by complete surprise. What did that have to do with it?

"No, of course I don't. I am an Engineer, and I'm running a large and widespread development organization. It is one thing that we make the best Quibber application in the world, but you have to understand that Quibberling is not my line of work at all."

"But I understand that you are now going to support GoogHole fully, including all the advanced features, with the new version of Zyklone? And that you have developed 56 new functions, actually in secret? And, because of this, you have had to squeeze the size of the controls quite a bit on the user interface?"

"True", said Mr. Tompkins, and then added with certainty. "But this is no problem[16]".

"How do you know that?" asked Dr. Good after another drawn-out pause, where he attempted to measure the conversational climate. "After all, you are now also claiming that people can Quibber while on the move, in planes and trains?"

"Correct" replied Mr. Tompkins, who could not yet see where all of this was leading.

"Would you say that trains are usually rattling along the tracks, causing passengers to move with the carriages – perhaps especially here in Borduria, considering the state of the tracks?" Before Mr. Tompkins could reply, Dr. Good continued "Try to start the prototype of Zyklone Gold v.3 here on you PC, and select 'New Quibber' on the menu."

Mr. Tompkins did as asked, still more than little bit bewildered, but slowly starting to see where this was leading. When the main Zyklone user interface appeared on the display, he was however very surprised when Dr. Good grabbed his right wrist, pressed it to the table, and started to shake it in a disjointed way.

"Go on" said Dr. Good, still rattling Mr. Tompkins wrist, which caused the mouse to move, and with it, the cursor to jump erratically on the display. "Go on, select 'New Quibber'".

Mr. Tompkins did his best, but the 'New Quibber' button on the Zyklone user interface was so small, and Dr. Good was shaking his wrist

so much that he could not get the cursor to rest on the button for long enough to click it. Finally, Mr. Tompkins had to admit defeat. Looking rather displeased, he uttered

"I can't click it while you are shaking my wrist."

"But that is exactly the point" Dr. Good exclaimed. "Zyklone Gold v.3 might not work well on trains."

"Of course it will. My staff has designed it for that…" Mr. Tompkins slowly lost momentum. What was this? Clearly, it was the idea that users should be able to Quibber on train rides, one of the basic requirements, and one of the basic reasons to upgrade from v.2. And yet?

"Did you ever test this – I mean, did you ever put anybody on a train with the Zyklone prototype, to see what it was like to Quibber with the new user interface under those conditions? Or even better, did you ever put anybody on the train, early in the design phase, to see what it would be like to Quibber on a train at all?", Dr. Good asked.

Sensing the welcome advantage, Dr. Good pressed on, and this kind of conversation continued for an hour or so. Dr. Good repeatedly asked what appeared to be the same kind of quite simple and down-to-earth questions, and the experience gradually caused Mr. Tompkins to suspect that there could be an element of truth in what Dr. Good was suggesting: The deceptively innocent questions were in fact not that easy to answer[17,18]. Finally, admitting to himself that that he should at least learn about the Devil of Usability before denouncing Him, Mr. Tompkins said

"OK, OK, then. Tell me the full story about this user stuff."

Explanation

"Well" said Dr. Good, "I will not lecture[19]. I don't think the deep academic background of Usability will change much for you, so I'll skip all the fundamental things about Human Factors epistemology[20] and so on, and I will try to keep things practical[21]. However, kindly ask if you need any elaboration on any of the points".

Keeping his expression neutral, Mr. Tompkins nodded, silently wishing Dr. Good would move on.

"The first thing", Dr. Good said, "is the link between what is called Usability and what is called User Centered Design. You should note that Usability is the goal, while User Centered Design is the way to

get there[22]. If you are clear on that, let us first look at what should be achieved."

Here, Dr. Good flipped open his laptop, and started a PunchLine presentation, which he showed to Mr. Tompkins.

"As you see, Steve Krug[23] has a simple way of explaining Usability. He says that

> "Usability is not rocket surgery™: After all, usability really just means making sure that something works well: that a person of average (or even below average) ability and experience can use the thing – whether it's a Web site, a fighter jet, or a revolving door – for its intended purpose without getting hopelessly frustrated"

Now, who can argue against that?"

"Well", Mr. Tompkins thought, "that sounds fair enough, at least as a principle." However, being afraid of giving Dr. Good too much of a tailwind, leading him to elaborate on the theoretical background of Human Factors, he kept quiet. This did not matter, since Dr. Good went on as if not really needing an answer[24].

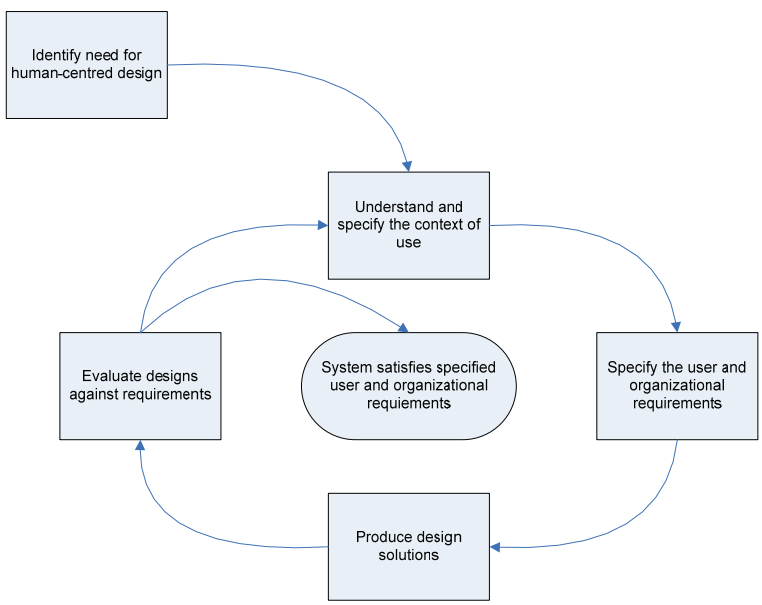

Figure 1 - The ISO 13407 User Centered Design process model

"Remember this as the target. We want things that are safe, effective, efficient and satisfactory to use[25]. In the international standards dealing with this[26], they put it more elaborately, saying that

> "Human-centred design is an approach to interactive system development that aims to make systems usable by focusing on the users, their needs and requirements, and by applying human factors, ergonomics and usability knowledge and techniques. This approach enhances effectiveness and efficiency, improves human well-being, user satisfaction, accessibility and sustainability; and counteracts possible adverse effects of use on human health, safety and performance".

And don't be bothered by the language in the standards – it just takes a little bit of getting used to. A good place to start is to read some kind of paper commenting on the standard, or explaining it in more everyday terms. I'll email you a piece by a chap called Maguire[27] right away, then you have a place to start, when you get round to do it. Oh, and by the way, don't get confused by the difference in names: Maguire discusses a standard called ISO 13407, and the one I just mentioned is called ISO 9241-210. The latter is however just an update of the former. They mean basically the same thing, and use the same method."

"Another thing you should not worry about is the applicability of these standards. They really represent best practice in the Human Factors industry, which Quesenbery[28] have demonstrated in her research. So, when you are discussing User Centered Design in the future, you can rest assured that if you base yourself on the standards, irrespective of the version, you will be running with the crowd."

In spite of having invited Dr. Good to come see him – or rather, practically having kidnapped him – Mr. Tompkins started to regret the entire thing. This was becoming too academic. Who really cared about all these numbers and names? What he really wanted was just a short, practical introduction, specific guidance, and then he could move on[29].

Somehow, Dr. Good seems to sense this, and starts to draw a figure on Mr. Tompkins whiteboard (see Figure 1).

"User Centered Design is not difficult to grasp as a concept. We have already agreed about the goal – safety, efficiency, effectiveness and user satisfaction. The practical part is also uncomplicated; there are just five stages that we need to discuss. The first point is really simple. It just relates to deciding to do Human Factors and User Centered Design. I guess that in your case, this is now settled, with the telegram from

TEACHER and all that" Dr. Good continued with a smile[30]. He continued

"The next issue is to understand and specify what is called the 'Context of Use'. It may sound a bit difficult, but it is really rather simple. You can say that our little experiment before is a way of demonstrating context of use. We pretended you were sitting on a train, trying to Quibber, and I was simulating the environment for you, by vibrating, or rocking, your wrist. If you continue along that line of thinking, a description of the context of use is a compilation of all such operational scenes, or scenarios, which describes the full width and depth of the operation of the application you are considering. Who is the user, and what is she or he doing? Will it be done by night, by day, indoors or outdoors or while igniting a rocket to go to the moon? Will the light conditions be bright, dark or will it be done under water? Will you be using a keyboard, a mouse, or thought-tracking of the cursor? The list of factors to consider is of course very long, but you should ask yourself this question: If you don't know about all these conditions, and can't tell your developers about them, how can they get it right?"

Mr. Tompkins did not answer to that immediately, initially thinking that describing such working scenarios was just another way of wasting time. He started down the familiar, comfortable road of believing that his team knew everything about Quibberling, but then he recalled the little experiment about the shaking train. Could they have forgotten to specify that in their requirements specification[31]? Worse, maybe their development process was not as watertight as he considered it to be? With the dilemma clear, but unresolved, he decided to pay more attention to what Dr. Good was explaining[32].

"Then comes the more traditional discipline of translating user requirements to technical requirements, and to design the application. This is done in the second box in the loop" said Dr. Good. "I don't expect I have to tell you much about that, if you have your background in the more traditional, sequential software development methods."

Mr. Tompkins nodded, and, knowing that Dr. Good could not teach him anything on writing requirements, felt better. Things were finally making sense. In spite of still smarting from the experience with Dr. Good shaking his wrist, he thought the entire thing came down to common sense after all. Of course, he should make sure they improved on their requirements, by having a brief look at this silly train scenario and others that could have slipped through the net, but he could see that the next box in the figure (see Figure 1) was known territory: Implementation.

"OK. I get it now. You basically just recommend that we spend a bit of time on revisiting our requirements, and then move on according to plan. That should not take more than a week, if I can get the key developers in for a workshop tomorrow, and by doing so, we will be back track by the end of next week."

Dr. Good stayed silent for a long time, again causing Mr. Tompkins to become impatient. Finally, though, Dr. Good said

"Well, it is perhaps not as simple as that. You see, there are still a number of things we need to talk about. One of them is the next box on the figure, 'Evaluation'. Here you have to test the design against the requirements, assessing whether your solution is really fulfilling the users' needs. You can say that this is what we also did with the little shaking-train experiment. This experiment failed, since you couldn't click on the 'New Quibber' button. As the figure shows, you will then have to iterate[33] through the development stages we have discussed until now."

Here, Dr. Good started to recount the various development stages, again using his fingers. The habit was annoying Mr. Tompkins, and he wished Dr. Good would stop - it was reminding Mr. Tompkins of his German-teacher when he went to school, who did this during grammar instructions. German had not been Mr. Tompkins favourite subject.

"First, you have to reconfirm the context of use, which in our little exercise could have been 'Quibberling on the train'. Then, you have to revisit the requirements, perhaps formulated as 'Capability to select a 'New Quibber' from menu', and the design of the function in question, in that case the size and position of the 'New Quibber' button. Finally, you need to evaluate the Usability of the solution: Was it effective, efficient and satisfactory to start a new Quibber session under the context of use specified?"

Now Dr. Good had two little hectic red spots on his cheeks, and held four stretched fingers up in the air, and for the second time that day, Mr. Tompkins mood went south at alarming speed. Not only was the wretched man using his fingers again, but worse: Testing all functions, under real conditions? And worst of all, iterate? Did this fellow really know what he was talking about? For the last 30 years, Mr. Tompkins had made a point of seriously planning his development projects, and sticking to the plans. The only success criteria in this business were to deliver 'On Specification, On Time, On Budget'. Every first-grade school-kid knew that iteration was the pest of all predictability, a bomb under the very foundation of providing at least a

degree of risk mitigation to software development. When, later on, Mr. Tompkins consulted his memory, he was not sure how he managed to keep quiet, and not explode and kick Dr. Good out of his office. Maybe it would have been better if he had spoken out, because his silence caused Dr. Good to continue.

"Another thing is that maybe it is not only the key designers you should get in for a workshop. In user centered design, you have to have the active involvement of the users in the development. In my view, the only way to do this is to augment the design team with the competences you don't have readily available in your development team, like human factors specialists, and of course the users. You might also have to add other stakeholders…[34]"

Seeing the color rising in Mr. Tompkins face, Dr. Good finally kept quiet.

Realization

Had it not been for Mr. Tompkins suddenly noticing the infamous telegram from TEACHER lying on his desk, he was unsure of what would have happened next. Seeing it, and recalling the seriousness of the situation, not only for himself, but for the entire development staff, he however managed to compose himself sufficiently to call Delectia, and ask for more coffee, more cookies, and – otherwise unheard of – the small bottle of Boartzj, the local apricot-brandy, he knew Delectia kept in the freezer in the kitchen.

Quick-witted as she was, Delectia grasped the uniqueness and urgency of the situation, and knocked on Mr. Tompkins door within seconds. Carrying a tray with the apricot-brandy and two glasses, she entered with a charming smile and said

"Mais, Monseiur, quelle agreable surprise…"

Gracefully, she poured the pale, ice-cold liquid, and presented the tray with the drinks to Dr. Good and Mr. Tompkins.

All in all, this exercise gave Mr. Tompkins sufficiently time appraise his new-found knowledge on User Centered Design. The Boartzj did the rest, including calming Dr. Good, who in the meantime had realized that he had been skating on paper-thin ice. Internally, Dr. Good warned himself: It had happened before, and now he had repeated his mistake. He really needed to control himself better when he talked himself warm on his favorite subject, and he should not allow himself to be carried away. It had the effect he just saw, his enthusiasm

was making User Centered Design too overwhelming, and still too academic[35]. Especially the point of iteration seemed to be very difficult to discuss, surprisingly enough, since it really just was a method of slowly building up the requirements base, instead of believing – deceiving – oneself that you could really identify, understand and unambiguously describe every single requirement up front[36].

"So", Mr. Tompkins began, "what you have been telling me means that we first of all should reorganize our development team, or perhaps even form a Usability Team, consisting of users, developers, human factors people, maybe someone from sales and so on?"

"True" replied Dr. Good, cautiously, but warmed by the Boartzj, "you need to enroll the users in the process. 'Know your user' is the first rule of Usability[37]. But you will most likely also need Human Factors experts, or ethnographers, or anthropologists – someone who can make sense of what the users are doing, and explain it in terms that are useful to your managers and developers."[38]

"Since you already have a very successful product in the market", Dr. Good continued, "you should be careful not to lose that advantage. Your current product might well have defined part of the way people Quibber, and most likely, many of the features and methods you have in the current application should be kept also in v.3. To capture that, what you could do is to make an assessment of the current product as the starting point, perhaps as an 'expert walk-through'."[39,40]

Reflecting on 'war stories' he had read in the professional Journals he usually kept himself up-to-date with, Dr. Good stayed silent for a while. The situation had clearly improved, and the tone between him and Mr. Tompkins was amicable once more. The earlier incident, in spite of ending with a toast of Boartzj, had however showed how sensitive the situation was, and he felt that any further pressure from his side could once again ruin the entire issue. He realized the need to keep the focus, which really was about transferring knowledge to Mr. Tompkins organization – but, initially, to Mr. Tompkins himself, a process that should also result in gaining Mr. Tompkins confidence and support[41]. On the other hand, there were a number of important issues that he felt sure Mr. Tompkins needed to know about, if this was ever to be a success. One of these issues was to reach an understanding about iteration, and the uncertainty it appeared to bring with it. Another was to discuss and decide on the methods they should apply for assessment, and the determination of usability criteria to measure against, when they came to that. There were many more points on his virtual list of things he should tell about. The jelling of teams[42], for one, meaning the

long time it took from the first team meeting to the moment where the team was really effective, and worked towards a common goal, across the epistemological gaps that are inherent in such a multidisciplinary construction[43]. Most importantly, he should attempt to turn the present discussion towards something practical, something that would connect with Mr. Tompkins[44].

In a flash of understanding, however, it dawned on Dr. Good that he would never be able to transfer sufficient knowledge to make this a success – not in an afternoon, and not in a week. A brief course was not enough; the subject of Human Factors was not, after all, common sense[45]. Sooner rather than later, the development of Zyklone would meet with an unforeseen usability challenge, internal resistance, or simply an issue that required a change of tactics. Dr. Good drew the inevitable conclusion, secretly also admiring the cunning of Professor Northman, who had foreseen this situation, and had arranged he, Dr. Good, should stay in Fidelz after the Professor himself and Dr. Nilsson continued onwards.

"Mr. Tompkins", he finally said, a bit awkwardly and not without self-consciousness, "Maybe you would like me to stay on for a while here in Fidelz, and help you lead the Zyklone Usability effort?"

Postlude

As on many other days, Mr. Tompkins used the last hour before bedtime to sit in his study at home, overlooking the Bordurian Mountains to the west, enjoying the dying rays of sunlight, and the golden coloring of the landscape before him.

What a strange day. Rewarding, perhaps, full of learning, perhaps, but strange. This morning, he had really never thought about User Centered Design, and usability, and context of use, and all the other concepts that appeared to go with this domain. Now, however, he not only had a world class usability consultant on his staff, but he had also taken the first step towards providing what well could be a better product to his customers. Everything considered, this was quite a change of direction.

In that light, Mr. Tompkins was certain that today would be remembered, but he was not entirely sure if it would be remembered only in a favorable light. With all the change lying in wait, and all the new skills, tricks and traps that had to be managed because of this, today could well be remembered as the day when real trouble began.

Only the future would tell.
Continuing to reflect, he found his trusted diary, and wrote:

- *Usability is really simple. It is just a question of providing the right tools to the right persons, depending on the job they have to do, and the circumstances for doing it.*
- *User Centered Design leads to good Usability.*
- *User Centered Design is also simple. When you design the tools for a particular job, you make sure that all the important stakeholders and skills are represented in the design team. Then you simply listen to the needs and circumstances of the end users, and makes sure that the end result satisfies their requirements.*
- *The science-stuff used to explain usability and User Centered Design seems very complicated. We need to explain it as simply as usability itself, preferably in a practical way the design staff can immediately relate to their work.*

Mr. Tompkins then leaned back, and thought about the idea of having a design team that contained all the stakeholders, including end-users. Clearly, there would be advantages, and he could see that having everybody round one table would result in less guesswork. He could however also see an endless string of requirements coming up along the development line, and he feared what could be literally endless discussion, and no progress. He realized the management complexity of UCD, and added the following in his diary, with a thoughtful frown on his brow:

- *User Centered Design clearly has downsides, from a management perspective. There will however also be upsides, and we need to focus on them: Fewer specifications, more room for creativity, a more dynamic development environment, where the result will emerge and be perfected in short cycles. This will probably appeal to the engineers, once they see that side of things.*

Massaging the frown on his forehead, he then closed the diary. He took off his glasses, leaned over and turned the lamp off, better to enjoy the last light, the deep purple sky, and a few clouds high up, still pink from the sunset.

Notes to this Chapter

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[1] The temptation was too much. Mr. Tompkins is the archetype engineering practitioner, in my casting, and he is exhibiting the traditional values and viewpoints of the engineering profession. That Mr. Tompkins would consider usability and user centered design as common sense is entirely as expected, according to Forsythe (1999).

[2] I have admittedly borrowed the country of Borduria from Hergé, with thanks. I have however refrained from borrowing and using Hergés Secret Police 'Zepo' when Mr. Tompkins is having Dr. Good 'invited' to join him on page 8.

[3] Apart from applying a bit of imagination, no further explanation should be required.

[4] Mr. Tompkins is referring to the traditional 'Waterfall' software development model (IABG, 1992), which, in spite of its age and the invention of many new and supposedly more appropriate concepts (Boehm, 1988; Graham, 1992; McConnell, 1996), is still widely used (Neill & Laplante, 2003, 2004) in the software industry. It should in this context be noticed that even the critics of the sequential development models manage to see their advantages (within certain limitations): "The more closely you can stick to a linear, waterfall-like approach – and do it effectively – the more rapid your development will be", McConnell (1996) notes. Mr. Tompkins is hence a mainstream software project manager, sticking to the proven methods. One should however also note the conservatism in the choice of development paradigm as being typical of engineering behavior and knowledge, as this is described below by Koen (Koen, 1985, 2003), Bella (1987), Kerr (2008) and others, who have concerned themselves with the epistemology of engineering.

[5] 'Quibber' is my invention. It is an undefined discipline that humans undertake, which originally was done by hand. With industrialization, machines were invented helping humans to Quibber, albeit in an analogue form. The impact of ICT did not leave Quibber untouched, and Quibberling became a digital exercise, like so many other human undertakings. In Mr. Tompkins

world, Quibberling is now a fully digital undertaking, which has moved onto the PC – which of course will allow anyone to Quibber, even on the move: In trains, ships and aircraft.

[6] Adding functions to software, without having real documented user needs or requirements, seem to be normal in the continuous war between competing software houses. Experientially, such functions are requested, or even required, by a single influential client, and they may well be tailored to the usage of that particular client. Nevertheless, such functions are more often than not finding their way into the standard set of functions offered by the next scheduled release of the application. In the author's organization, this practice has by now been labeled 'function creep'.

[7] Mr. Tompkins here speaks from the author's own experience. Having done a survey of an HMI, and identified serious usability concerns, the author was nevertheless reminded by the Technical Director of the company producing the interface that "this HMI has sold a lot of systems". Under the circumstances, the author tactfully refrained from asking whether the market success was rather in spite of the user interface, than because of it (see the case of Project Gamma, page 74)?

[8] Mr. Tompkins is here displaying a very common behavior when it comes to User Centered Design and Usability, by assuming that the designers are the best representation of the users (Bader & Nyce, 1998).

[9] Any resemblance to living persons is fully intended.

[10] Again, I wish to express my heartfelt thanks to Hergé for inventing the country of Syldavia.

[11] The first, basic draft of this chapter was written while spending time on the French Riviera. The name of the best hotel in the Bordurian capital is inspired by this location.

[12] (Pew & Mavor, 2007).

[13] Dr. Good is citing Pew and Mavor (2007, p. 32).

[14] Here, Dr. Good is referring to McConnell's book on 'Taming Wild Software Schedules' (1996). In this book, McConnell is referring to a study performed by the Standish Group, where they found that the involvement of users in the development process was the most important factor in the more than 8.000 projects surveyed (1996, p. 236).

[15] Mr. Tompkins is the perfect project manager for a software project as the one considered: The success criteria are to deliver the product on time, on cost, as specified. In the experience of the author, no other metrics apply when it comes to this kind of projects.

[16] Mr. Tompkins is here speaking along the lines described of Engineering organizations (Vaughan, 1996), which have a "worldview that survives despite evidence that repeatedly challenges it basic assumptions".

[17] In the interest of shorting the story as much as possible, I have allowed Mr. Tompkins to become convinced – or at least admitting that there could be something to User Centered Design after all - uncannily quickly. As the rest of this thesis will show, this change process could easily take months, rather than hours, and would experientially feature a broad collection of resistances. Bella (1987) describes the mechanisms of changing engineering knowledge, involving, as it does, careful evolvement and controlled change as the cornerstones of the process. Since the effectiveness and desirability of such changes have to be assessed before being endorsed by the disciplinary community, it is clear that the cycle of change is slow. It is also clear that many potential enhancements of the engineering knowledge base may never come to fruition, either because they are not implemented in real-world projects, or because their qualities are never disseminated in professional circles.

[18] Dr. Good is here using what I have come to believe is the best way of conveying the utility of User Centered Design. Using existing applications, and performing a mild-mannered, good-natured or even outright humorous evaluation with the designers, seem to have potential for causing contemplation without anybody loosing face (see for instance the case of Project Gamma, page 74).

[19] Probably against his will and knowledge, I have forced Dr. Good to ignore the epistemological gap between Engineering and Human Factors, as initially described by Bader and Nyce (1998), and as discussed by Bowker (1998), Dillon (1998), Rosson (1998) and Simonsen and Kensing (1998). A follow-up of the discussion is initiated by Petersen, Nyce and Lützhöft (2010), something which is expected to trigger further analysis and discussion of this subject. Discussion and further elaboration of this subject is, on purpose, reserved for the future, either by the author, or by other researchers.

[20] Dr. Good is here refraining from talking about Meister (1991) and his definition of Human Factors as a science that is uniquely considering both a 'behavioral principles to physical configurations' and a 'physical parameters to behavioral effects' transformation, and the dual utility of knowledge springing from this epistemology: HF is both about explaining things involving humans, but also about utilizing knowledge to anticipate human behavior.

[21] Dr. Good is taking account of the understanding that Engineering is a practical undertaking, not a science (Bella, 1987; Kerr, 2008; Koen, 1985; Petersen & Lützhöft, 2009).

[22] Reference is made to ISO 9241-210 (2009).

[23] Reference is made to Krug (2006).

[24] This exchange is typical of what the author has experienced: While the entire concept of User Centered Design is both acceptable and logical at the personal level, it seems to dilute, or indeed vanish, when it is elevated in the

hierarchy of organizations. The reasoning is left for future work, but the mechanism seems to be factual.

[25] Dr. Good is here referencing ISO 13407 (1999) directly.

[26] See (ISO9241-210, 2009).

[27] See (Maguire, 2001).

[28] See (Quesenbery, 2005).

[29] Mr. Tompkins is once again reacting true to the description of Engineering found in literature. He would basically just like to have a few simple guidelines that could be implemented right away. This matches the Koenian description of Engineering being based on a set of heuristics (Koen, 1985), and Kerr's reflection about the practical view of Engineering (2008). Mr. Tompkins line of thinking is also matching the description provided by Forsythe, when she explains about Engineers just asking for a single paper to inform them about human factors (1999).

[30] The author is here forcing Dr. Good to display a remarkable lack of sensitivity – but it is done in the interest of keeping a narrow focus in the story being told in this chapter. In real life, Dr. Good would know that the organizational decision and buy-in to undertake User Centered Design is contentious, and likely to be up for re-examination on one or more occasions during the undertaking of the work – as the remainder of this thesis will attempt to demonstrate and elaborate upon. A complete analysis of this very central issue is however reserved for future work, by the author or a like-minded researcher.

[31] Mr. Tompkins is here touching on the allegedly weakest point of the sequential software development methods, including the V-model and the Waterfall model: They demand that the specifications which are forming the foundation for the development are complete and unambiguous (Boehm, 1988; McConnell, 1996).

[32] Mr. Tompkins is continuing to be very cooperative, contrary to the description of Engineering and engineering practitioners found in literature (Bader & Nyce, 1998; Bella, 1987; Forsythe, 1999; Koen, 1985; Vaughan, 1996). His behavior is however forced by the author, again in the interest of keeping the focus of the story, and shorting it to the extent reasonable. There is however little doubt that a real-world Mr. Tompkins would be much harder to convince (Petersen, et al., 2010). More in-depth analysis of this issue is left for the future.

[33] Iteration is a requirement under ISO 13407 (1999), stated as one of the characteristics of User Centered Design.

[34] Dr. Good is here quoting ISO 13407 (1999), which specifically requires the active involvement of users. Maybe because the situation is becoming difficult, he refrains from telling Mr. Tompkins that he should also consider proper task analysis and function-allocation between the users and

Zyklone. The requirement to use multidisciplinary teams is also an ISO 13407 requirement.

[35] Dr. Good is sharing concerns, experience and behavior with the author, who came to realize that engineering and academic practices are difficult to mix, and who has drawn the personal conclusion that 'lecturing' the Engineering community about Human Factors is a doubtful way to proceed (see the case of Project Gamma, starting on page 74). Rather, providing practical advice, or indeed heuristics, seems to be a more promising the way forward.

[36] Dr. Good has is sharing his view of the sequential development methods with Boehm (1988) and Graham (1992).

[37] Dr. Good is here referencing Nielsen (1993).

[38] Dr. Good might well have read the paper on the re-engineering of ethnography (Petersen, et al., 2010). At least, he is expressing the same though, which is that not only does ethnographers and anthropologists need to study the user community and make sense of it, they also need to translate the learning gathered in that way into something the Engineering community can use.

[39] Dr. Good is touching on an issue which is perhaps underdeveloped in the literature on User Centered Design: How to gather, understand and operationalize user knowledge and user acceptance about existing products, in order to use this as the foundation for evolving new versions. As will become evident in subsequent chapters, the author is here basing Dr. Good's advice on what was actually done in the field study reported in this thesis.

[40] By design, the author is allowing Dr. Good to skip the discussion about the other potential benefits an expert walk-through of the existing product might have. Experientially, this could be partly in terms of convincing key personnel about the advantages (and especially disadvantages) of the current version of the product, and partly to raise awareness about the organizational culture that lead to that position. This subject is at this stage reserved for future research, either by the author, or by other researchers.

[41] Dr. Good's reflection shows a very good insight: If you want to change an organization, you need managerial support, or buy-in. Without that, the first sign of serious discussion may put the change agent under such pressure that the change might well end there and then, before ever seeing daylight (Gulliksen, Boivie, & Göransson, 2006; Zuber-Skerritt, 2001).

[42] DeMarco clearly made an impression on Dr. Good, with his useful, or maybe provocative, knowledge about 'Peopleware' and the formation of productive teams (1997; DeMarco & Lister, 1999).

[43] Bader and Nyce as well as Petersen et al., have written about the epistemology gap between Human Factors and Engineering (Bader & Nyce, 1998; Petersen, et al., 2010). In brevity, it is found that such a gap is not a

phantom; it does exist. Furthermore, in way of mitigation, translating user knowledge into intelligible design solutions for the implementing engineer requires a double translation, an analysis of two tribes rather than the usual one of users of the application in question.

[44] This realization of providing a practical example, rather than telling, or even worse, lecturing, about usability and UCD, is probably the key to gain a foothold in a 'hostile' environment, which engineering organizations initially appear to be when it comes to this subject. Dr. Good is directly voicing the authors experience in this case.

[45] Dr. Good is building on experience similar to what Forsythe (1999) expresses in her piece on being an ethnographer amongst engineers and software developers.

RESEARCH SPHERE: THE USABILITY OF USER CENTERED DESIGN

Usability

I believe that good usability is paramount.

Good usability is what reduces the number of errors a user of a given system may make. Good usability is an expression of the satisfaction the user will experience when she or he is using a well designed system to do what they have to do. Good usability is what gets the job done, effectively and efficiently.

Formally, usability is defined as the

> "extent to which a product can be used by specified users to achieve specified goals with *effectiveness*, *efficiency* and *satisfaction* in a specified context of use" (authors emphasis) (ISO9241-11, 1998; ISO9241-210, 2009, p. 3; ISO13407, 1999, p. 1),

a definition Karlsson (2000) recommends as the most appropriate, even though more comprehensive views are available.

In more everyday terms, Krug (2006) describes usability as

> "really just […] making sure that something works well: that a person of average (or even below average) ability and experience can use the thing – whether it's a Web site, a fighter jet, or a revolving door – for its intended purpose without getting hopelessly frustrated" (Krug, 2006, p. 5).

Rubin suggests that usability consists of one or more of four different attributes, including Usefulness, Effectiveness, Learnability and Attitude (1994, pp. 18-19), and Nielsen refines this suggestion, and defines usability as having five components: Learnability, Efficiency, Memorability, [low number of] Errors and Satisfaction (1993, p. 26).

For the purpose of this thesis, I have chosen to define usability as a union of the above, i.e. as 'the extent to which a product or process can be used by specified users to achieve specified goals with *effectiveness*, *efficiency, ease of learning* and *satisfaction* in a specified context of use'.

Designing for Usability

Usability requires a conscious effort. “You can only design your way to usability”, Gulliksen, Boivie and Göransson (2006, p. 592) notes, and to do so, a method, or a number of methods, applied for the purpose of designing for usability, are required.

According to Quesenbery (2005), ISO 9241-210 and ISO 13407 ((ISO9241-210, 2009; ISO13407, 1999))[3] describes the primary, or universally accepted and applicable, methods for designing for usability. In particular, she notes that

> “A brief examination of presentations on user centered design at industry conferences easily shows the influence of this standard [ISO 13407]. Whether it is mentioned by name, or whether the process described simply mirrors the one in the standard, it is clear that the industry has embraced at least the principles and broad outline of this standard” (Quesenbery, 2005, p. 452).

In practical terms, ISO 9241-210 (2009) defines the meaning of UCD – or Human Centered Design (HCD), as the standard chooses to name it – as

> “an approach to interactive system development that aims to make systems usable by focusing on the users, their needs and requirements, and by applying human factors, ergonomics and usability knowledge and techniques” (p. vi).

A few words about the naming of the discipline might be in place. At some stage, computer vendors came to the realization that users was more than an inconvenience, and introduced the term ‘user friendly’, but the term is not really appropriate: Users do not need ‘friendly’ machines (Nielsen, 1993), but machines that will support their work, as discussed above, along the axes of effectiveness, efficiency and satisfaction (ISO9241-210, 2009; ISO13407, 1999), which is congruent with the goal of the human factors science with respect to human-

3. It should be mentioned that ISO 9241-210 (1998) is a revision of ISO 13407 (1999), replacing the latter.

systems integration (Wickens, Lee, Liu, & Gordon Becker, 2004). Because of the shortcoming of the 'user friendliness' term,

> "user interface professionals have tended to use other terms…the field itself known under names like CHI (computer-human interaction), HCI (human-computer interaction, which is preferred by some who like 'putting the humans first' even if only done symbolically), UCD (user-centered design)…HF (Human factors)…" (Nielsen, 1993),

but no matter the term, for the human factors specialist, the central focus of design revolves round the importance of the user (Wickens, et al., 2004), irrespectively of whether the expression used is 'human' or 'user'.

As such, the two standards mentioned here establishes UCD as one of the methods to achieve usability, and furthermore provides the main methodology: The core of UCD is to focus an iterative design process, conducted by a multidisciplinary team (ISO9241-210, 2009; ISO13407, 1999), on the use and users of the subject under consideration – usually a system, device or instrument of some sort. The focus on the users includes the due consideration of their characteristics, needs and requirements in the context of their work and working environment, and the UCD process is designed to maintain this consideration, through the direct and continuous involvement of the end-users, as a minimum for the duration of the development process, or better, throughout the entire product life-cycle (Nielsen, 1993).

Research Focus

As outlined in the Prologue, one can ask: 'Is User Centered Design usable'?

My research is pursuing this issue as the central, ultimate research subject, using the definition of usability provided above, i.e. whether or not user centered design is effective, efficient, easy to learn and satisfactory to apply.

Since the concept of usability itself is context dependent (ISO9241-210, 2009; ISO13407, 1999), so is the research question. Karlsson (2000) notes that "The use situation as a whole must addressed and understood before any recommendations can be made as to the design" (2000, p. 54), which stresses the necessity of considering the

intended context-of-use of user centered design. ISO 9241-210 (2009) provides an insight in this respect, by stating that

> "There is a substantial body of human factors, ergonomics and usability knowledge about how human-centred design can be organized and used effectively",

and continuing that

> "this part of ISO 9241 [210] aims to make this information available to help those responsible for managing hardware and software design and redesign processes to identify and plan effective and timely human-centred design activities" ISO 9241(2009, p. iv).

In plainer terms, the statement conveys the impression that the context-of-use of user centered design is industrial application within the IT community, but this issue is never spelled out entirely in ISO 9241-210 (2009), even though the implied understanding is elaborated in a later section:

> "The information in this part of ISO 9241 [210] is intended for use by those responsible for planning and managing projects that design and develop interactive systems" (2009, p. 1).

Research Question: Definition

Utilizing the above, substituting the term 'usability' with the wording from the definition, and adding the context-of-use explicitly, my research question is defined as

> 'Is the application of UCD according to ISO 9241-210 effective, efficient, satisfactory and easy to learn for those responsible for managing hardware and software design and redesign processes?'

Before moving on, I would like to make one thing very plain: This thesis is not on a mission to raise criticism towards what I consider to be a most important and well prepared international standard, and ISO 9241-210 (2009) is not the target, but rather an invaluable reference on user centered design. The

process the standard describes and explains is however what is being scrutinized.

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PRE-KNOWLEDGE

Readers Note

In some traditional forms of participant observation the background of the observer may have little impact on the setting, and it may have been the intention that it should have none at all. In insider action research and autoethnography, however, where the researcher has the dual role of participant and observer, the researcher does have direct influence on the events being studied. Under those circumstances, I suggest that it is required to gain insight into the researcher and his or her background, to subsequently make meaning of understandings and interpretations: "Who the researcher is, is central to what the researcher does" (Bullough & Pinnegar, 2001, p. 13).

The present section is provided as a mean towards this end.

The ATOMOS II Pilot

My first real exposure to Human Factors was when Dr. Schuffel of TNO in the Netherlands walked into my office in the middle of 1994. The purpose of Dr. Schuffel's visit was to suggest that we should work together in an EC project revolving round the interaction between the human element and technology in maritime transport. Happily accepting this offer, we subsequently cooperated on the ATOMOS II project (1999), and a further number of projects following downstream. One of the tangible results from this cooperation was a suggested standard for the human-centered development of Ship Control Centers (ATOMOS, 1998), which at best can be described as a marinized version of ISO 13407 (1999), up to and including that the ATOMOS work actually refers the FDIS version (Final Draft International Standard) of this standard.

The work on ATOMOS II (1999) counts to some extent as a pilot for the work undertaken in the current context, however with the significant difference that ATOMOS II was a pure research project, and not an industrial undertaking. The point is that while many things of a more or less experimental character can be trialed, and maybe even accomplished, in a research environment, it does not mean that subsequent industrial application is necessarily possible.

One of the lessons learned in ATOMOS II related to the work in multidisciplinary teams, which is an inherent part of UCD (ATOMOS, 1998; ISO9241-210, 2009; ISO13407, 1999; Nielsen, 1993). In this project, I spent 18 months having fruitless discussions with one of the team members, who was a psychologist. I honestly did not fully appreciate why we were arguing, or not necessarily even what we argued about. To me, the case was quite simple: We were designing a range of maritime instruments, with some novel functions. We needed someone to design the corresponding HMI. The 'someone' was the psychologist. The HMI should be uniform across the instruments. It should have good usability. The designer should use the latest cognitive knowledge in the design. Yet nothing happened, or actually, what I then saw as stalling tactics happened, in the form of apparently irrelevant questions, which the multidisciplinary team in any case could not answer at that point of the design stage: The actual tasks to be undertaken by the user, the allocation of functions between user and instruments, and hence the functions provided, how they worked, and so on. Why, I asked myself more than once, could the psychologist not just do the design in a general sense, and then we could tweak it a bit later on, when the details became available?

Another lesson learned from ATOMOS II related to communications. Apart from the incessant arguments about the HMI design, the psychologist and I also seemed to talk past each other on most other occasions, in spite of the fact that we got on well together, at the personal level. The word 'system' caused a lot of what I took to be unfathomable problems. What was the issue? In a ship, you have a lot of different systems, some for fuel oil, lubrication oil, ballast water, fresh water, hydraulics, compressed air and so on. Being a naval architect, I knew more than most about this. Yet, why was the psychologist always telling me that I had to understand the 'system'?

In hindsight, these problems might appear to be banal or maybe even naive, but they were not at that time: they were actually causing a lot of friction, lack of project progress, and general unhappiness in the team at large (since various subgroups in the team seemed to side with either of us).

Resolution came in shape of a very long nocturnal conversation on a park bench. During this conversation, I finally grasped two distinct issues: Firstly, the HMI was not a discrete, isolated component where the only concern was look and feel – it was the direct connection between the user's mental model of the process and the process itself, and it could not be usefully designed without that knowledge. Secondly,

in the psychologists terminology, 'system' did not mean the mechanical 'systems' I was talking about, and which were to be managed from the HMI – it meant the socio-technical 'work-system', considering the human-machine combination.

The Client HMI Pilot

More recently, meaning during the last decade, I have been applying usability development principles on select cases – at least to the level of involving end-users in the design. For a Client, I have initiated and conducted the design of a Human Machine Interface (HMI), which served to demonstrated the value of user involvement in the design process for those involved: easier user acceptance of the final result, and reduced rework, also providing risk mitigation of the business risks associated with software development (McConnell, 1996).

At the corporate level, we have also been using select usability principles on a mid-sized scale, concretely as the methodology for HMI development of a new series of operator panels – focusing on consistency across a series of different sizes of panels, with different interaction means. In this case, the main issue was to design an intuitive HMI which grew in functionality as the corresponding hardware grew in capability – from the very simple, to the rather complex. An important aspect of this work was that it involved some of the same players as the main projects reported here did, including Pegasus[4] and Crux, and that this project similarly was sanctioned by Leo, a manager in my organization.

The Impact of Pilot Studies

In summary, the above paints a picture of me as a 'human-factors aware' project manager, with some experiential knowledge regarding UCD under the belt. It should also, importantly, provide the understanding that the organization I work for was (and is) both

4. In some parts of this thesis, persons are named after the larger constellations close to Earth (and thus known and valuable to mariners for guidance), for the sake of anonymity

'human-factors aware' and 'human-factors sympathetic'. I cannot take the credit for the latter: Leo participated in ATOMOS II (1999) as well as I did, worked on the conceptual standard for ship control center design, as I did (ATOMOS, 1998), and got hooked, as I did, on the importance of human factors engineering during that phase. Our sharing of that reference frame is invaluable in the current context: Not only did it provide a gravitational force towards UCD as such, but it pre-empted any discussion about applying UCD in Project Alpha at all: We saw this as natural, given the 'once-in-a-lifetime' opportunity to redesign our HMI from the ground up. Our shared beliefs also provided the stamina to hold on to the decision during that project, even when challenged from various points.

RESEARCH PROCESS

How does one assess usability? – and in particular, considering the present case: How does one assess the usability of a process[5]? Conceptually, usability can be assessed in a number of ways. Pew and Mavor (2007) outlines four different approaches towards the evaluation of system or product usability:

1. "Evaluation of the user's performance and satisfaction when using the product or system in a real or simulated working environment. Also called evaluation of "quality in use" or "human in the loop."
2. Evaluation of the characteristics of the interactive system, tasks, users, and the working environment to identify any obstacles to usability.
3. Evaluation of the process used for systems development to assess whether appropriate HSI[6] methods and techniques were used.
4. Evaluation of the capability of an organization to routinely employ appropriate HSI methods and techniques" (2007, p. 265)

Of these methods, the first three could in principle be applied to any usability project, irrespectively of how mature the implementing organization is, while the fourth by nature is irrelevant when it comes to pioneering, as is the case in the present study.

As things stand, I did not have a choice with regard to the concept. Rather, it was a question of 'Carpe Diem', of grabbing the opportunity presenting itself in the course of 'everyday' life in the office: I was given the opportunity to lead a major User Centered Design project, tasked with the development of a brand-new Human Machine Interface (HMI) for a series of maritime instruments. Seeing the academic potential in the situation, I obtained corporate permission to study the process as it went along, and the data gathered in this way is the pivot point of this thesis. Originally, the work done on Project

5. If one was to develop the question further, it could well lead to a Russian-doll type of confusion, for which reason this is only done at footnote level: 'How does one assess the usability of a usability process etc.?'
6. HSI is an abbreviation of Human-System Integration.

Alpha, as it is nicknamed for this thesis, was to be the entire data collection for the present work, but as things developed, UCD caught on, and the work on Project Alpha lead to cooperation with sister companies and clients, leading to two other cycles of UCD (Projects Beta and Gamma).

By describing and sharing the experience of actually attempting to follow ISO 13407[7], within the context-of-use of an industrial engineering R&D department, what is really being reported here is a set of usability evaluation experiments, along the lines described above (Pew & Mavor, 2007; Rubin, 1994): A triplet of monitored and recorded applications of the standard, documenting the user's performance and satisfaction when using the methods described in the standard in the real working environment.

Construction of the Tales

Some notes should be made about the construction of the tales contained in this thesis, and my positionality during the research.

The duration of the UCD activity on Project Alpha was two years, spanning the calendar years of 2008 and 2009, and I managed the Project Alpha Usability Team for that duration, from the first to the last sentence spoken. As you might gather from the tales that follow, it was a 24/7 job, in which I at all times was immersed in my natural habitat of project meetings, project management activities, reporting, planning and travel. And, from time to time, during which I found myself on the bottom of a muddy trench, preparing to answer fire from any of the likely shooters: Team members, Organization members, Managers and other stakeholders who felt that the User Centered Design activity required 'input' from their side.

For the entire period of the research, I kept a research diary. I attempted to keep it updated on a daily or weekly basis, but with daily pressures and activities, that seldom worked out the way I wanted it. As many other action researchers, or practitioners, I had to recourse to making notes on indiscriminate scraps of paper, taking photos (and especially photos of white- and blackboards full of strange notes and illustrations), archiving in- and outgoing email's and whatever other

7. ISO 9241-210 is the current version of the standard, but when Project Alpha was conceived, ISO 13407 was the standard in force.

available representations, to keep my memory on track. Fueled by such material, I managed to update my research diary on a rather regular monthly basis, and each version was subsequently forwarded to my academic supervisor, who was also one of the Players in Project Alpha. As such, a certain validation is implicit in my notes from the field as far as Project Alpha is concerned, but in the present context, I have not explored or exploited this in any particular fashion, and I am not claiming this supervision, in the form of a very knowledgeable second pair of eyes, as another voice. Perhaps this is an unwise stance, and perhaps it is unjust to that particular Player[8], but I feel that if I am in error here, I err on the side of caution. In any case, my research diary contains approximately 85.000 words, and some 150 illustrations. In addition to this, the rest of my research file contains approximately 4.000 emails received, approximately half that number of sent items, and dozens and dozens of presentations, specifications and all the other paraphernalia of a large industrial project.

Project Beta was very different from Project Alpha, in the fashion that it only lasted a few months, and that the engagement over that that period was very low: A few hours here, and a few hours there. Considering note-keeping, the progress of Project Beta was reported in my research diary as well.

From the research diary material, I have chosen to distill five tales, of which one is particular to Project Beta, and four are particular to Project Alpha. With regard to the latter, I have chosen to recount them as more or less individual, subject by subject. I realize that this might be at the direct expense of consecutiveness and parallelism. I furthermore acknowledge that this is experimental, and that I run the risk of presenting things out of context. I have striven to avoid that, however, and I further believe that this risk is a reasonable price to pay for the stand-alone quality and overview it provides. I finally acknowledge that this method will make the relevant periods of Project Alpha appear simpler, more structured and more sequential than they were, but I advocate that the overall recounting of the selected experiences, or the extraction of learning, is nevertheless clearer and better served in this fashion. For prospective managers of UCD, in case there are any such creatures among the few readers of this thesis, I therefore urge you to use your imagination, and consider tackling all of

8. See ‘The Project Alpha Cast’ on page 39 for further explanation.

the stories in parallel, including the untold ones – because this is what you will be subjected to, and this is what will be expected from you, when you throw yourself at such an undertaking.

The four Project Alpha tales do not cover the entire experience of this undertaking, or all the aspects of the work the usability team did. There are multiple angles and facets that I have left uncovered – rather reluctantly – for the matter of sheer volume, and limited resources. I have, as I trust you will find appropriate, chosen to focus on the outcome of the project, as well as the three challenges that were the most surprising to me, in their nature, their duration and their persistence. To be frank, the latter were well beyond my experience, but you should in any case not despair. The story ends happily, as noted, and I propose that if you have a certain level of conviction, patience and stamina, you will be entirely successful in your own user centered design venture.

Project Gamma was different, at least the part that is reported in this thesis. The tale on this project recounts only the initial meeting on a user centered design activity, and the first draft of the story was written in one very long sitting, directly after the meeting. In that sense, the autoethnography itself, as it is presented here, replaces the detailed notes that otherwise has been used for the constructing of the narratives.

With respect to the construction of the tales from Projects Alpha and Beta, and for the explicit purpose of making the representation transparent, in order to help the reader to 'walk with me', in a Schöenian (1983) and impressionistic fashion, I have attempted to use the quotes from my research diary as widely as possible. Sometimes I even use them exclusively, where I believe they speak for themselves, or make the points I would still make today. The quotes used have been selected for their appropriateness with regard to the point of the particular tale, but I acknowledge that the selection process itself is also a filtering of data of sorts. In that respect, I have tried to walk the tightrope of not leaving out anything of importance, in the context, while attempting to limit the extensiveness to a level where I believe the point of the tale is well established, but not exaggerated in scope or volume.

Regarding the practical process, each tale was created by copying the relevant notes electronically from the research diary into separate documents, preliminary subject by preliminary subject – selected, as mentioned above, for their surprising nature or the successful outcome of the project in question. This initial process also

included changing the original names and places to the pseudo names and labels that I have been using to anonymize the notes for the purpose of the narratives. Following that, no further editing of the notes has taken place, and the tales have been constructed simply by 'filling in the blanks': No additional sorting or analysis has taken place.

I am suggesting that by doing so, I source the narrative as closely to the observation as possible: usually, the first haphazard notes were made within hours of the events recounted, and while they are obviously both subjective and filtered through my eyes, my understanding, my moods, interpretation and the predominant world view of the time of writing, I still suggest that this is as close as I am likely to get to the 'truth', as it was subjectively seen.

Notes from my research diary are marked by using a font resembling handwriting, to make it stand out in a reasonable fashion,

and are unmistakably different from literature quotes, who follows the normal academic convention used in the rest of this thesis. To keep authenticity and avoid data loss, all quotes from the research diary have retained their dating, according to the date on which the event occurred. I suggest that this will provide a way of appreciating the time element in each tale.

Ethics and Anonymity

In the tale of 'Project Gamma: The Instrument Design Case', and in other selected places of this thesis, I have used the names of astronomical constellations as pseudonyms for the participants, which I suggest offer sufficient anonymity in those cases.

The Project Alpha Cast

In Project Alpha, however, this procedure appears inadequate: It is simply not anonymous enough in this case. People you work closely with are too easy to identify, both for themselves and for others, if the only discriminator is another name. I find such handling of identity to be inadequate and unethical, a view that is backed in literature (McNiff, Lomax, & Whitehead, 2003). I have, as a substitute, invented a number of generic persons, namely the Manager, the Resistor, the Doubter, the

Supporter, the Evaluator and the Player. The Salesman is also dropping by, occasionally. As the generic persons they are, they can appear either singularly, or in greater numbers: any particular situation can be 'staffed' by a number of Managers, Evaluators, Resistors and Players – if the Supporters and the Doubters are absent that day. Persons are not permanently assigned to any of these categories, either, and membership changes temporarily based on the actual behavior in any given situation. Hence, you may be a Supporter one day, and a Resistor the next. Your designation may change by the hour, even. Any or all members of the Cast may be present when the discussion takes place in the Team, or they may not. Where I believe it is important, I have added comments to this effect, as appropriately. Finally, some of the generic persons are internal, i.e. employed by the Organization, while some are external, i.e. participating on a consulting basis. Where required for the meaning of the Tales, this positionality will be made clear.

I am suggesting that the approach of creating roles for the involved individuals has no negative side effects on the telling of the tales, or the learning I claim they result in: I am, after all, not studying any of the individuals who worked alongside me in any of the projects, but my own interaction with them, and my own reactions to their stimuli. It is, I suggest, of no importance whether the readers of the tales are able to identify the actual persons as individuals, or simply as 'forces' acting on me, with the emotions, impressions and pressures that caused.

From an ethical perspective, I suggest that the nature of the self-study focus is of importance. I am investigating myself, and the necessary permission, ethically, is bound to me (McNiff & Whitehead, 2006).

That being said, I was still concerned about the ethics involved in the study I was doing, since it could be argued that the members of the Project Alpha multidisciplinary team were participants in the research, and hence that the research undertaken was second-person oriented and not purely self study (Coghlan & Brannick, 2005). To forestall such potential ethical dilemmas, the Project Alpha team members were briefed during an extensive session on ethics and research. They were informed that the Project Alpha development process was being researched. They were further informed that they were not the subject of research, that their involvement was voluntary and that they at any stage could reverse their judgement and withdraw

their permissions for using data obtained by observation. They all gave their informed consent on that basis.

The Project Alpha 'Resistor'

The generic person I have christened the Resistor is prominent, and deserves a more elaborate introduction. He is, I suppose, a person any usability project manager might well encounter, if the subject relates to the evolvement of an earlier or existing product.

In more precise terms, the Resistor I concern myself with here is characterized by having a long experience within the field in question, and he is someone I would expect to be a stakeholder in any earlier or current version of the product being considered. I imagine the Resistor is a person who has been involved in the design of the previous product generations, and who has also taken, or influenced, design decisions unilaterally, perhaps for decades, as a conscious or perhaps even unconscious part of his daily work. Being in the position he is, and having the skills, experience and application expertise he has, he is the obvious technical candidate to include in a multidisciplinary design team. There, however, he is suddenly confronted with another process (user centered design), where the design decisions are taken in the multidisciplinary design team, collectively, guided by explicit principles, and monitored for quality and consistency.

When the Resistor joins a multidisciplinary design team, I consider it reasonable to suspect that he feels that he loses his former freedom, and I would not find it surprising, either, if he feels that his prior competence is put into question, simply by the user centered design process itself.

Furthermore, I believe that there might be an issue of professional respect between the Resistor, as he is described above, and some of the other members of the multidisciplinary team he joins: for obvious reasons, the various members of the multidisciplinary team are of different orientations and backgrounds, and I consider it not entirely unlikely that there is a built-in philosophical and epistemological barrier between the members of such teams. Under those circumstances, I would not be surprised if the Resistor would use whatever means available to reverse the situation, and bring him back into control.

I hasten to add that I do not suggest the Resistor behaves as he does out of ill will, but rather, I believe, out of a cast iron conviction of his knowledge, principles and experience, and, I speculate, his claim of

appropriateness of earlier solutions. One should not ignore or forget that the Resistor who fits the above characteristics will have historical evidence of the quality of his thinking and doing, and one should never, ever, ignore that the Resistor well may be completely and utterly right, and may have forgotten more about the application in question than you will ever learn. I suggest that the Resistor is treated with that in mind, but also with understanding of his situation, that may be complicated and painful: It is the task of the usability manager to bring out all the useful experience in the light of improved usability, and to circumvent occasional bouts of stubbornness, unwarranted tradition or conservatism.

TALES AND REFLECTIONS

> "The anthropologist who returns alive from some exotic place must know something nontrivial about it"
>
> (Kirk & Miller, 1986, p. 18)

A Triplet of Experiences

You are about to enter the development sphere of marine electronics.

The products in this sphere includes the Radars, electronic charts, automatic identification systems, voyage recorders and alarm, monitoring, control and automation systems that supports the safe passage of ships with a minimum of crew onboard. The work in this sphere includes the specification, design, implementation, test, approval, pre-production and deployment of prototypes.

Systems as these monitor the health of the ship and her incredibly massive and powerful mechanics, and enable a chief engineer to control a 50.000 horsepower diesel engine – at the gentle touch of a button, so to say. Or to turn a 50 tons rudder, fitted to a 250.000 tons ship moving at a speed of 20 knots – with the precision of 0.1°. Or they allow a sleepy third mate to see through the driving rain and early morning fog outside the windows of his warm and safe bridge. Or to know where his ship is, and how deep the water is below him.

As you might imagine, the electronic infrastructure on modern ships is a bit complicated, and the applications employed are rather sophisticated. And yet, the general public, the owners and the operators of the ships, as well as the crews, expect that they can manage their mammoth charges under all circumstances, error-free, safely and in full control.

Somewhere, somebody is developing these systems. For dramatic impact, one would like to depict this as going on in dark and damp cellars, the work being carried out by gnomes, or by mad scientists in white lab coats and strange hair operating endless walls filled with elaborate equipment and blinking lights. The reality is different: The work is done in everyday offices, dotted with the occasional workshop, the tool of the trade increasingly being a standard PC. The somebodies doing the work are typically engineers,

experientially, trained in as diverse disciplines as mechanical engineering, naval architecture, control engineering, communications engineering and software engineering. There might be a handful of wizards on exotic subjects such as microwave engineering and underwater acoustics involved, but even they seldom fit the 'mad scientist' image.

The task for these engineers is deceptively simple: Make the best-selling system, which usually is taken to mean the system with the most features, the highest dependability, the best after-sales service and the lowest cost. You should not underestimate the latter; it is, I suggest, the most important, and eventually decisive, parameter of them all.

Literature tells us that the methods used in industrial development are rather traditional (Neill & Laplante, 2003, 2004), but occasionally, the peace is disturbed, like when someone suddenly insists that system usability should play a role, that the next generation of equipment should be 'effective, efficient and satisfactory to use'. The disturbance, in this case, is of a wider scope than one might be able to appreciate at a glance: usability is usually achieved by the application of user centered design (ISO9241-210, 2009; ISO13407, 1999; Wickens, et al., 2004), and user centered design mandates the use of a multidisciplinary team (ISO9241-210, 2009; ISO13407, 1999; Maguire, 2001). For the staff in the development department, this may not be the best of news, since a multidisciplinary team forces itself onto a territory that, in my experience, used to be exclusively 'engineering practice country'.

Thus, as one might imagine, the change from the more traditional developments to user centered design may not be the perfect recipe for a peaceful day in the office, and in this case, one's imagination is not far off: The tales in this chapter are tales of doing user centered design IRL[9], or attempting to do so. The tales are based on the undertaking of three industrial projects; none of which was conceived for the purpose of study or intellectual musings, but where I was fortunate enough to participate, and study 'on the sideline'.

The first project, named Project Alpha, is a large project that strives for a high level of usability spanning across the entire suite of shipboard electronics, from mast to keel, from stem to propeller.

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9. IRL: In Real Life – commonly used in electronic chat.

The second project, Project Beta, was a ‘quickie’. It relates to creating an owner-specific bridge arrangement that ergonomically suits the crews of a particular class of ships more appropriately than a standard layout. The work undertaken involved the ‘geography’ of bridge layout, and the grouping and placing of instruments.

The third project, Project Gamma, is an ‘in-between’ project when compared to Project Alpha and Project Beta in scope and complexity, concerning as it does the application of the outcome of Project Alpha to a specific application, in order to integrate it into the larger suite of bridge instruments.

Welcome to my world.

Readers Notes

Before getting to the nuts and bolts of this section, it might be helpful with a gentle reminder about the purpose of these writings. My research question, in loose terms, is about whether or not the doing of user centered design is effective, satisfactory and easy to learn for somebody like myself: The manager of development projects. To get a benefit from moving through the coming narratives, I suggest it might be useful to keep this question in the back of your mind, when you share the experiences of the field with me; by doing so, I hope and perhaps even imagine, you might arrive at the same conclusions that I did myself. And then again, you might not; it is entirely likely that I, in my subjectivity, focus and narrowness, have missed many imperative points or findings.

I would, in any and all cases, be genuinely pleased if you would share your views with me[10].

10. The author can always be reached by email at styhr@chalmers.se

Project Alpha: The Integrated Bridge System Design Case

Introduction

This is in brevity the tales about the Project Alpha Usability Team, as it soon was to be known in the Organization, and how we fared. It focuses on what I find is four important aspects of large-scale user centered design: Teambuilding, barriers, method and outcome.

'The Tale of Team Jelling and Buy-in' starting on page 51, takes you from the inception of the team, to the moment where I judged it to be functional as a team. Saying, however, that the team was functional, is not, as you will note, the same thing as saying that the challenges were over, or that the barriers had vanished: The initial barriers, encountered during the team jelling phase, in some cases grew taller and steeper as the process moved on, and this development is recounted in 'The Tale of the Resistor', starting on page 65. In general, things were not simple in those days, and as 'The Tale of the External Player', commencing on page 74, will demonstrate, further complications were added. There should however not be tales without a happy ending, and 'The Tale of Success', the beginning of which you will find at page 81, will show you that the effort spent on the Project Alpha user centered design effort was well spent – at least from my perspective.

The Tale of Team Jelling and Buy-in

For me, everything started in earnest when I, having received Organizational blessing, approached the Supporter, floated the plans we had about applying user centered design in our coming product range, and suggested a meeting. Closely thereafter, I went to see him:

> 08-11-2007: The discussion with the Supporter was a very rewarding exercise, and resulted in good results…the roles in the team were defined, and the way to move ahead was agreed upon…Other good stuff came from the discussion…learning and respect in the project design team must be established. Team-building is probably the tool. A trip on… was agreed, and is to be arranged.

As said, as done. The multidisciplinary team was formed, based on an analysis of the skills we thought we would need, agreements were struck and contracts were signed.

We then all met in the early, cold, grey morning of January 6th, 2008, somewhere in the southern part of Sweden, in order to go on a short 'cruise' together. The maritime venue was chosen partly for professional reasons, partly for ambience, and partly to make sure that nobody sneaked off during the night, and got lost. Spending two working days together, we socialized, networked, and got to know each other a little bit. This was very much the intention, and my research diary recalls that

> 04-12-2007: [I] Did…nothing to hide that the [first] workshop was an attempt at teambuilding, mitigating on the not-too-good experiences from ATOMOS II.

Afterwards, evaluating the experience, I noted that:

> 07-01-2008: The overall impression from the workshop is that this paid off. Everybody got the same introduction to the project, and there was understanding and acceptance of the various roles – both individuals, and the connection between [us]. Certainly, everybody got to realize the complexity of [the Project], but also the ambition in the project (from a UCD point of view) and – most importantly – the competences gather around the table.

With the foundation of the team in place, my concerns began to revolve round the methodological problem: How were we, considering that we already had a well-reputed product in the market, going to

capture the pre-existing know-how and virtues of the Organization and the Product?

Following rather lengthy discussions (see also the 'The Tale of the External Player' on page 74 for 'added complications…'), we decided that an objective identification of the strengths and weaknesses of the current product range was an appropriate method:

21-01-2008: Spent quite some time on discussing the method, where agreement was eventually reached on having co-discovering teams evaluating both the task level and the communications level.

We furthermore decided that we wanted to involve the primary stakeholders of the current product in the evaluation, assuming that it would show them that while some of the available features and solutions were good, others were perhaps less so. As such, we were seeking buy-in into the user centered design process, while we anticipated and proactively attempted to overcome the resistance we were rather sure we would encounter at some stage. My diary recalls:

18-02-2008: Expert review of the current Product [X and Y]…the day was worthwhile…The [X] is actually not bad – but the [Y] is certainly having potential for improvement.

25-02-2008: Expert review of [Z].

25-03-2008: Started the [second] assessment of [Z], with the Players…many inconsistencies, and much room for improvement. Oh, well, this is definitively not a waste of time and resources!

26-03-2008: Did the expert evaluation on the [second level] of [X and Y]…Same result as the day before: Many inconsistencies, much room for improvement. Had to give up on several counts – couldn't simply find our way round…An entire rework of the [Y] is a must.

As you might appreciate from the laconic diary entires above, everything was not in 'good working order' with the current product: in my vocabulary, 'improvement' does often mean 'disastrous'…

I was not, however, in much of a doubt concerning the rather pressing need for change, considering our ambition towards better usability – and as a prerequisite, a better understanding of user needs in the Organization, which was however a stony field, from my perspective:

28-02-2008: Spent the last three days discussing System Requirements for the [X] and the [Y] with the Organization. Highly necessary…but not bringing the project much forward, if at all: There is simply no vision, no progress, no nothing to be had…it seem that the motto is same-same…If that is what they want, that is what they get…I wonder if this is just the beginning of a well-known disaster: Building a system on poor and reduced requirements, only to find that the real requirements existed, but only in the head of somebody who didn't have the ability to express them – or weren't even asked…The only way out…is to change the development methodology, and introduce iteration…we will have to do it [for the] HMI…

11-03-2008: Spent the day…discussing [System Requirements] – still the same picture, no vision, no progress – just the old treadmill. Luckily, I believe, that other winds are blowing…

Hoping to create a beachhead for change towards user centered design, and the crucial recognition of 'user needs' as the driver for system requirements, we (I and the Supporter) continued to pursue the idea that 'seeing is believing', that change could be driven through example: We believed that by being present during the expert evaluations of the current product, seeing domain experts struggling with doing supposedly uncomplicated actions with out equipment, and by participating in the subsequent analysis of such incidents, our Doubters, Managers and (potential) Resistors would realize that the Organization needed to change development strategy. My diary recalls:

13-03-2008: Prepared the agenda for the [next] workshop, the focus being to debrief with regard to the expert evaluations undertaken, to heal the wounds certain to bleed, and to end on a positive note with trying to sketch out a new beginning…

As the entry shows, we also realized that it would be a potentially hurtful experience for some of the Players, to hear the shortcomings of 'your baby' being discussed. Not taking that as (undue) criticism requires openness of mind and a good portion of self-confidence, I imagine, and we steeled ourselves to encounter a number of engineering practitioners in a predominantly defensive mode.

The evaluation workshop was held in late March, 2008:

27-03-2008: First day of the…workshop, which yielded quite good results. First and foremost, everybody accepted the state-of-the-art with

respect to current usability problems, i.e. the findings from the four expert evaluation sessions (not that one could reasonably not accept the findings, the evidence was there, but in any case: It is extremely important that everybody realizes that our current product is not as good as it could be). Even more important was the last session of this day, where we did some analysis (in plenum) on the subject: Why did it go the way it did with the current generation? Findings were illuminating[11]…

An interesting issue came about during the [analysis], when I ventured to a Doubter that we lacked domain knowledge. He got quite upset – and it took a while before I got it made clear that while we know everything there is to know about our product subject – we don't necessarily have maintained our understanding of context-of-use, which keeps changing continually, but which we don't monitor in any systematic fashion. Quite the contrary, actually, we just believe that our know-how is intact and current. He didn't look happy…

Thinking back, the amicable conduct of this workshop was a bit surprising; in spite of the care we took to make it plain that the purpose of the exercise was forward-looking, and not a penalty-expedition, hunting for scapegoats[12].

28-03-2008: Second day of the…workshop. Certain guys are getting impatient…The important part of the day however came when we decided to try to apply the core part of the Concept Design [process]: To create Personas…and to build scenarios…Had a great afternoon inventing strange (and not-so-strange) personas…and building a nice scenario…Continued with trying to list the information the [user] would need…. Moved on by attempting to do the overarching design of [Project Alpha]. I think everybody (eventually, maybe) understood what this was all about, and how this 'but-this-is-not-real-work' could lead to a proper design.

When I later sat down to reflect on the workshop, I was pleased in a general sense, and believed that especially the recognition (albeit being forced on the Players) of our current usability problems would serve as the stepping stone for buy-in into UCD. The impatience of some members related to lack of practical progress, which arguably was correct. Being an issue of methodological uncertain, it was also

11. See Table 2 on page 107.
12. Project Gamma provided a comparable experience. A discussion of this is included in the chapter 'Discussion: Results', see page 99.

worrying me from that particular perspective – a subject that is having a central position in the 'The Tale of the External Player', see page74. The research diary entry for 28-03-2008 in any case supported an optimistic view on progress, and continues:

Reflecting on the results of this workshop, I was happy. In anticipation, it had looked difficult…As things were, the result was good (The Supporter thought baby-steps; he could be right from a technical point of view) since this was adding another anchor of usability-thinking in the minds of the Team – or rather, especially in the unconvinced parts of the team. Made an evaluation towards the end of the second day, and got nothing but positive feedback – but I not entirely sure that they all are 100% earnest. Maybe some politeness is still being applied. Will examine further at the next event.

My impression about the positive outcome was boosted by a message from one of the Players:

31-03-2008: …got a very nice email from the Supporter, on the subject of [the last workshop]: "…I feel that the group has come considerably closer and that the spirit in the group is very positive. I liked that in the end, [one Doubter] was talking about "mental models" and even [another Doubter] looked like he could sell this ☺ Besides, it was fun!"

What goes up, must come down, they say. From the good spirit of the workshop, things quickly returned to the very ordinary again, especially my belief in having changed anything in the Organization by our last workshop:

07-04-2008: Spent the day in…, again on the subject of System Requirements. Even though I've spent perhaps 25 sessions with these guys, on various SRS's, the lack of vision and invention is still as depressing. Mechanical, slow evolution seems still to be the name of the game. Sigh.

I nevertheless kept my word of the 28th March at the next workshop (April 29th and 30th, 2008), where we further developed personas and scenarios, and where I as usual invited the Players to evaluate and reflect prior to breaking up.

30-04-2008: Did some good reflection at the end of the event – and this time, although all positive as it was at the [last] workshop, it rang more true. The Doubter even admitted that he had been skeptical after [the March workshop], but now was becoming convinced (politeness was thus a correct guess…☺).

At this stage of diary-keeping, I leant back, mentally, and did some reflection about the month of April, 2008, which, in spite of a few 'downs', came up on the bright side:

On the [Project Alpha] front, usability is becoming more and more firmly anchored in the minds of the usability team, and I feel that we have started to produce the Ambassadors I hoped for, internally. The usability team is working well, and the [latest] session was so far the best, I believe. This is partly because we are starting to know each other, and understand. In Tom DeMarco's (1997) words, the team is jelling. Great.

The positive attitude continued in May, and I continued to find examples and see the fingerprints of the individual team members, who synergetically was adding to, refining and polishing what I believed was becoming a very useful result.

15-05-2008: …Workshop…This was as expected a difficult day…the subject of the workshop was to define the [Project Alpha] General Concept, which was homework from the workshop in [April]. So far, so good, everybody had done what they should, apart from [one of the] Players, who backed down from the exercise, on the ground that he simply didn't have that competence in his toolbox. Fair enough…a lot of good ideas came forth, and the discussion was lively. In spite of 'local' discussion', the concept for HMI is firming up, and is obviously influenced by the multidisciplinary team. We wouldn't have ended where we do if a subset of the group had done this alone. The workshop form IS good and productive. Don't let anyone else tell you differently…

Nevertheless, the exercise took its toll on my temper, and I came to reflect on the importance of the Project Manager as the whip, pushing the team.

16-05-2008: Usability Workshop in… – 2nd Day. Better, but still not a walk in the park. Convergence doesn't come by itself! – with modesty, if I hadn't pushed, pushed and pushed (or huffed, and huffed, and huffed…), we would still be debating.

In spite of me showing a bit of wear and tear, one should believe that things were now going steadily in the right direction, with some (slow) rate of improvement in the performance of the team. Certainly, I did, and I was looking forward to the final workshop before the vacation season, which would close the conceptual part of the design,

resulting in the final confirmation of the overarching set of principles, and the common look and feel for Project Alpha, which we had defined, and into which each of the main applications X, Y and Z fitted.

31-05-2008: …Believes that things are going in the right direction; the concept is firming up, and the external Players homework (got a sneak preview on 30-05-2008) will point us in the right direction. It should be possible to achieve the goals for that workshop, which will also mean that the [Project Alpha] concept will finally crystallize.

In the same diary entry, I also reflected about how I was conducting the project, and, implicitly, the need to squelch my own impatience and desire for results. One should not forget, in this context, that I in principle had a staff of developers standing by, to start implementation. My Manager was also reminding me of this, from time to time:

…a note to be made: Consensus-building is a time-consuming process – but there is no alternative. Steamrolling issues of common concern is double counter-productive: First, participants will feel that they are not taken seriously, and will stop voicing ideas and input, but they will also start to mistrust the process – 'why are we here at all, and will this ever lead to something that I can subscribe to?'

And then we began.

02-06-2008: Usability Workshop…– 1st Day. Not as easy as hoped for…the afternoon was spent – slightly frustrated, I believe – in order to reach [the] conclusion: That the concept was viable…Quite a long haul, and most taxing for the patience. Must not steamroll, though. What we did manage on the first day was to identify the ingredients that would define the [Project Alpha] HMI, and which can serve as the foundation for individual application design, [but] the mood was however not really positive, and the [detailed discussion] seemed to me to be simply a symptom.

Discussing it with the Supporter and the Player after the day closed made us once again revert to the issue of uncertainty…or lack of trust in the process.

The day also contained a quite high number of 'why-do-we-have-to-harmonize-in-any-case'-like questions (another sign that it became painful to take decisions), and attempts at other barriers. All of a sudden, it became very important to discuss whether [a certain detail made sense]. Not really an important issue, but made important – perhaps to torpedo the overall concept, or at least to retain some sort of independence, application by application. All of

this, in any case, caused me to break a bit early, to give everybody a bit of a breather.

At this stage, two subjects, which later in my experience became 'old friends', became really visible on my inner Radar. Firstly, the pain involved in commitment, in the closing of doors, or in the burning of bridges: The downside part of making decisions, of having or taking responsibility.

Secondly, that trouble in the team does not appear before it really is decision-time, i.e. before each member is firmly between the proverbial rock and a hard place. Not that either is surprising, retrospectively, and perhaps it is common wisdom. I just didn't have it as explicit knowledge before. The evasive maneuvering exhibited by the members in such a situation is also, I suggest, making sense in this particular light, since the purpose could appear to be a postponement of the real decision-making, or at least could serve to keep a few doors open, if they were successful.

03-06-2008: Usability Workshop in…– 2nd Day. The second morning concentrated on chasing away the demons. Had the Supporter demonstrating that [a particular solution was OK].

I had only limited success with my ghost-chasing. The research diary entry continues:

Spent a lot of time on [a hot subject], which really could get people excited. At a certain point…I retired from the discussion and agreed to [the solution required by the Resistors]. And what happened: Completely surprising, this wasn't good enough, even though this was what [they] had asked for all morning. I called a break, telling the [Resistors] to decide on a common solution before we moved on! We ended with a different solution, but that is another story – the relevant issue here is that it hurts to make compromises and hurts even more to commit to same. On the other hand, consensus must be achieved. [A] point is to consider [is] whether there is an easier way towards reaching consensus than my own crude method – of cutting off retreat; [of] herding the cattle towards the [solution]…?

Need I say more? The little incident demonstrates, if nothing else, that some discussions pass the point of utility, and continue to be a matter of principles, or even an intellectual battle, or a battle of will.

In any case, the experiences at the June workshop caused me to reconsider my options. The entry for June 3rd, 2008, continues the reflection:

In terms of results, the workshop eventually produced what it was supposed to: A finished concept…[but] stepping back in reflection, the entire workshop process causes an emerging issue to resurface: it is needed that workshop participants believe in the process, the right to change, the right to become wiser, the right to iterate – and that nobody believes that the '[Organization]' – synonymous with the Big Bad Wolf – will deny that right at a crucial stage.

Repeated the message that we are iterating, and supposed to change as we learn, on the first afternoon, but I'm not at all convinced that anybody really trusts this. The Doubter asked very concrete questions to the process, and the work products from the usability team…and even [my lengthy reply and commitment] didn't make the doubt go away, as far as I could see. He didn't look happy, or relieved.

Evaluation at the end of the workshop brought a bit of sunshine, though:

During the evaluation of the two days [with the Players], a number of important points were raised:

- The Usability Team is jelling. There is more understanding, and more respect for and of each other.
- The work in the Usability Team is changing the members, and the way they think. 'Usability' is by now more than a word for those who were uninitiated at the beginning – it is becoming more tangible, and the contemplation of the members is positively affected.
- Consensus on the general concept has been reached, and the team is ready to split apart into smaller sub-teams for the design of the individual applications. That is a most important milestone.

Furthermore, this time, I got positive feedback from the Doubter, rather than from the Supporter. An entry in the research diary dated June 4th says:

04-06-2008: Got the most terrific feedback from the Doubter, in the form of two cartoons…[they] are of course good and funny in themselves, but the greatest part of the thing is that the Doubter described that he recognized the Organization in the [most conservative] corner, himself (until now) in the

[friendly, but uneducated] corner, and our dear Resistors in the [corner characterized by not making any design decisions]…

Obviously, the [Project Alpha] Usability Team is in the [UCD] corner. [This is] the second piece of evidence that people are being informed through our process, and a small but important victory… – thoughts are being thought, people are changing, slowly perhaps, but surely.

The rest of June having passed in a blur, I closed the spring season on a reflective note:

30-06-2008: Not a bad beginning of the summer! Not a bad half year, either, at any level. I'm quite satisfied with the progress of [Project Alpha], and the way we are producing what I believe is going to be a useful result. All the team-members also seem to want to go on, and become involved in the detailed design to follow, as well as assessment, which is a good sign that they believe in the process and the resulting product. Couldn't be better, really. Would however like faster progress, but it is an open question whether one can do these things much faster – there is an issue of maturing in it that may not be 'rushable'?

During the autumn of 2008, the Project Alpha Usability Team met in various subforms and smaller configurations, which caused the spring experiences, where the entire Team was present, to fade a bit. As you will see in 'The Tale of the Resistor', the autumn was not entirely laid back and relaxed either, and this clearly stole the focus, and helped suppressing the mixed feelings of the full-team sessions. Nevertheless, when another all-stars workshop was scheduled for late November, 2008, I prepared with a certain level of caution:

23-11-2008: Preparing for the next usability workshop. There are currently extremely many loose ends, and a very high amount of information and decisions (or semi-decisions) that needs to be cemented, somehow. One way – perhaps the only way – is to freeze those parts of the HMI design that can be frozen. I decided to prepare the agenda in this spirit – tying loose ends, putting an end to a discussion that could go on forever, if some of the participants are given the opportunity. Commitment is a nasty thing…for some, especially of [a particular] origin.

[It]…also means that the workshop could be painful, or worse. There is not really a good way to prepare for that, other than making sure that the arguments are in place, and solid – objectively.

Met with the team…

25-11-2008: Workshop-day…In the light of the reflections above – that it was time to put some nails in the design, and restrict the freedom of the Usability Team members somewhat, we went through the quite elaborate presentation that I had prepared, and step by step confirmed the decisions we have previously made. Mostly in the words of the Supporter (bless you for taking those notes!!!), the following issues are now conscious decisions, rather than being 'just there'…

Overall, it was a necessary exercise, but the going was very heavy, with a lot of heel-dragging and not much enthusiasm about the subject as such (or in other words: About having to confirm that something is good enough, or more bluntly, taking responsibility). An example, quite typical for the day, was that nobody wanted to comment on the very obvious question: Does the [X] design v2.1 and v3.0 display the information we want? I think I had to ask the question 5 times, and still there was only nodding – no verbalization.

Had a good discussion later with the Supporter, and discussed what was going on. Fear is what springs to mind. Fear of what? Too many bad experiences: Pavlovian reaction?

I also ventured – completely without any previous consideration – that the general character of the reluctant team-members is a 'being-a-specialist' quality. Neither of these Gentlemen are leaders[13], and they may hence be unfamiliar – or even frightened of – making decisions such like the ones we are discussing here. This could in some fashion explain why they are on the team in the first place: Highly regarded specialists – but maybe they have become such because they fundamentally don't like to be generalists, or even managers?

I felt the November 2008 workshop achieved a lot, and I believed that most of the rocky reefs were now in our wake. Perhaps that is why the events at the last workshop with the full team had such a surprise in store for me. I should not simply, maybe even complacently, have rejected the scout motto of 'Be Prepared'.

Applying the lesson learned in the foregoing workshops – the reluctance to commit – I should have known that I had set the course directly for 'Trouble Island'.

14-01-2009: Usability Workshop in…This workshop was planned to be the conclusion of the [overall] design activity as far as the Usability Team was concerned. The agenda was planned to accommodate [this conclusion], containing a

13. Meant in the sense of 'being in leadership positions' in the Organization.

lot of 'closing doors'. My ambition was to get approval to go ahead to prototyping with the Styleguide as such, and the (therein contained) main pages for [X, Y and Z], as well as [the main overview pages].

As such, the first day went well, insofar that the agenda was approved by the team and work proceeded. The Styleguide was approved. The [main overview page], both as concept and in terms of the actual layout, was approved. The idea of having individual [overview pages for Y and Z] was approved, and it calmed people quite a lot that they would be implemented using [an internal tool], meaning that final layout would be testable, rather than cast in stone.

The Supporter notes that *'All agree but without acclamation'*, which is a fair description – I actually made a bit of a farce about it, asking why it is so that critical remarks and disagreements always are made explicitly, loudly and clearly – while commitment is made with shyness, or preferably, not at all. Especially the Doubter has excelled in this way earlier, avoiding committing himself on some sort of pretext, or simply by looking the other way, or not looking at all...

And then came the [main page of X], and the biggest crash…

This was probably the strangest story of the project, so far. It started innocently enough, and according to the Supporters notes, the Doubter was happy with the design of [X] at 16:02.

The Doubter: "with the [X] we are through" (16:02).

I admit I was relieved when this was said, being apprehensive about this issue on the agenda (learnt the hard way from earlier sessions). Recalling an open issue, the Doubter however continued on the subject of [an important issue], having missed the corresponding session at an earlier workshop, where we decided to use [a particular solution]. Nevertheless, the issue was debated, and concluded rather open-ended by the Supporter, [who promised] to check whether any scientific results were available on the subject (incidentally, none are actually available…) Believing I got off the hook with this, I started a round-the-table session, seeking commitment. The Supporter notes:

Is this the [X] we are going to prototype? Given that the changes you suggested will be implemented…

And then, BANG. Cognitive lockup on the Resistor[14]. No other words can describe it. The short and sweet of it was that he found himself unable to

14. For clarity, it should be noted that this Resistor is another 'person' than the Doubter also appearing in the narrative. Hence, the new barrier came from an entirely unexpected direction, and the point

approve the main page [of X] before he saw the agreed changes implemented. I pressed him, and asked [him] why. The reasoning was wobbly, to say the least: He referred to an earlier stage of the project, where a [particular subgroup of the] team had made a number of suggestions for design changes, and where [the implementation of all of them was not] letter-perfect, but rather attempted [to] take inspiration from the changes. This caused, in the present case, suddenly an argument along the lines of 'earlier changes have been disregarded, so why should I trust you to do them now?' The Supporter[15], of all people, clearly didn't understand what was going on – I spoke to him later on, and he had a hard time believing that it could have been this chain of events that ultimately led to the impasse described. He rolled his eyes, and asked me whether it really, seriously, could be so? This caused, between the havoc, a good and somewhat ironic discussion of [the] rigidity [of people from a particular geographical origin].

Nevertheless, in spite of the rest of the participants agreeing to the design, verbally and explicit, the Resistor couldn't be moved anywhere whatsoever, but rather dug the trench deeper and deeper. It was clear that he accused me and the rest of the team of lying, or at least being insincere with regard to implementing the changes and modifications agreed.

The situation froze, and the next thing would have been to start throwing stuff at each other, physically. The strain must have been tremendous on the Resistor – he even said it: I feel pressed – and I openly agreed with him: He was certainly under pressure, but it was a strange situation, since the reason was unarticulated, and he was unable to even attempt: The trenches were simply being dug deeper and deeper, with no hope in sight.

I finally reached back through experience, and found what I was looking for, in the memory of the…management course I attended 20 years ago. There, in a similar situation, I didn't manage to resolve a similar conflict, but the learning of the subsequent debriefing was simply that I should have broken off the meeting, to allow everybody a breather (myself certainly included). I have often thought back to this moment, and it has later on been quite clear that I should have done so, then. This experience came in useful now: I broke off the meeting, asking the Supporter to perform the agreed changes…[and asking] the meeting to be reconvened at 18:30…

The result was the desired one, reflected by the Supporters notes:

18:52 [X] accepted for prototyping

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raised was essentially decoupled from the discussion between the Team and the Doubter.

15. In this case, the Supporter was the 'person' that had done the inspired changes, rather than the letter-perfect changes.

The learning of this incident is difficult, and again, not so. At the face of it, it is something that happens all the time (in other groups), and which has happened a number of times in this group as well, but just less pronounced: I see it as the fear of commitment, of participants being afraid of being associated with a result that the rest of the company, the colleagues, may not approve of. It can be considered as taking the last ferry, of burning the bridges, of crossing the Rubicon; the examples are countless also in terms of proverbs...

At the [research level], I'm less sure about the learning from this, or the significance one should place on it. It is clear that it adds to the required skill-set of the project leader, and it supports my theory that an outsider cannot really succeed in leading a change process like this one: He would at least need to be very sure about his organizational backing in a conflict like this. Can one learn more than that?

Maybe the best is to prepare the entire team for situations like this; it will make everybody more aware, and could serve to avoid the real conflicts if one had trained for conflict. It makes me ultimately think that setting and jelling of the team should be taken far, far more serious than what we did: And we even tried to have a session to introduce our fields of work, in order to generate respect. This exercise should probably have been taken much further, and should have had 'real' team-building activities included.

Heuristic: 'Usability teams are conflict-prone, and should prepare for emergencies'?

Mr. Tompkins would have been proud...☺

Nevertheless, and in spite of having gotten the work and the team back on track…the spirit felt low, at least to me. Went relatively early to bed, and had the feeling that the price of having this job sometimes is high.

15-01-2009: Usability Workshop in…, day 2. Remarkably, the day started with no hints of yesterday's prior follies, and the agenda was concluded with time to spare…

Adding to the above seems superfluous; I suggest the final reflective entry speaks for itself.

The Tale of the Resistor

The 'Tale of the Resistor' takes place late in the design phase of Project Alpha, and is as much as anything else an illustration of 'old habits die hard'. The' Tale of the Resistor' is a subset of a number of similar situations I have encountered during Project Alpha, with what I hope is a sufficient number of examples to be convincing and authentic, while not appearing to overdo things.

I invite you to thoughtful reading, beginning with my preparations for a workshop in November, 2008.

12-11-2008: …prepared the agenda for the coming…workshop. I guess I had expected a more or less general consensus in the group about the process outlined, and I got positive feedback from the Players. Not so with the Resistor, though…

14-11-2008: Action Research in action – failing? Got a worrying email from the Resistor, as a response to me urging comments to next weeks agenda for the Usability Workshop:

> 'I have been thinking a lot of your agenda, but I don't quite know how to put my comments. [Mentions specific issues and comments to avoid certain discussions] These thoughts have bee discussed with [a colleague] and he agree. Regarding the name "[system name]" I don't like it. I have made inquiries in-house and found no one who guessed that this was the [Z] system… '

The argument put forth by the Resistor in this case invokes what I have come to label 'leveraged resistance': He involves other persons to some undefined level, and in some undefined way, and make them support a particular view. In terms of resistance, it is effective because as the recipient of such a claim, you are clearly more at a disadvantage than you would otherwise be, if it was just one-on-one.

In the actual situation, I attempted to grab the bull by the horns:

17-11-2008: I had…time to discuss the strange conflict with the Resistor, in order to shed some light on the…issues – I was frankly astonished that he would react like he did. It turned out that he perhaps hadn't fully grasped my intentions (my mistake, most likely…communications is not always easy), but the key issue was that he is under pressure to keep…staff busy – and hence is quite prepared to sell the principles in order to arrive at a concrete set of solutions faster. History is, alas, repeating itself – HCD is not sufficiently well

anchored to withstand external pressure, and can (and will) be axed if I look the other way for just a fraction of a second – especially now, when the schedule is becoming tighter. In any case, we (I, that is) attempted to list at least 5 important things that could be [dealt with right away, and] which would keep the Gentlemen of that department occupied well into the next year, doing something meaningful – while giving us the remaining time we need to conclude the first part of the design in a decent and sensible fashion, HCD-wise.

There was good, but maybe disheartening, learning in this experience: The Resistor appeared to pay lip-service to user centered design, and acted from ulterior motives. Not a happy situation, but I decided to let it simmer, and 'keep on trucking':

19-11-2008: Project Alpha [system Z] warm-up workshop…It should have been plain sailing – until the Resistor blindsided me, again, and again unexpected. This time the subject was [an old and closed discussion], where he appeared to have forgotten what was previously agreed 'in class'. I repeated the pictures and slides, but no…it made the day very difficult. Only towards the end did we manage to get back on track, and eventually agreed on a nice and sensible solution.

What to learn? First and foremost, improvement in communications is a target to strive for, always. Patience is a virtue, always to be attempted. Anchoring is difficult, but must be done…

In the present context, the Resistor attempts, and actually succeeds, in opening a door that was already closed, much against my principles. The attempt in itself is, in my experience with these projects, one of the most commonly used tactics by the Resistor, in two flavors: either attempting to avoid to committing to closing anything in the first place, or, once closed, to attempt to reopen the discussion under some pretext, serious or inventive as the case may be. In any case, my diary entry regarding this episode also contained a bit of reflection:

[During the subsequent discussion] The Resistor was…unhappy…[but] he is…not ready to change much, when it comes to the point – the reason he has been relatively quiet so far is probably that he has believed that the decisions reached somehow didn't apply to [system Z]. How he can have this understanding is beyond me – but I actually asked him whether he didn't believe me when I said (and say) that there WILL BE ONE HARMONIZED HMI across Project Alpha…?

From time to time I encountered what I would term 'lock-up'. Lock-up describes a situation where the Resistor is deeply unhappy with the way things are going, where the gut-feeling tells him the team is

on the wrong track, but where he is unable to fully articulate the problem, or the solution. One example was encountered during the January 2009 workshop, as described in 'The Tale of Team Jelling and Buy-in' see page 51. Another occurred in November, 2008:

26-11-2008: Work[shop]: The design of [a particular feature], and the design of [another particular feature]. The former proved relatively uncomplicated…[and the latter]…seemed 'piece-of-cake', until [a particular issue] became the subject. The solution suggested…is probably a good solution from a usability point of view, flattening the hierarchy, and providing transparency of functionality at the same time. The Resistor, however, went into what can only be described as complete, 100% black 'no-mode'. He plainly did believe this was a poor solution [as compared to the solution in the current system]. No-one else in the meeting shared the viewpoint, and the discussion became quite awkward, to put in mildly. I did my very best in terms of patience and reason, and attempted to talk it through towards an amicable solution, but this time it didn't really work out: The Resistor remained more stubborn than I have ever before encountered from his side. Realizing that there was no immediate solution, I eventually I had to park the discussion by asking the Resistor to provide some kind of reasonable illustration of his dislike for the solution, stressing that if it proves poor, we will change it. At the point of writing this, I'm not sure about the reason for this very heavy resistance. It might be the specialist thing. It may be fear. It may be something we haven't yet realized – but it is certainly central to the issue of driving through something like Project Alpha.

In the actual case, not only the reaction from the Resistor was an issue; I also realized that I had misjudged him for some time. That stung as well, not improving on my general outlook…:

That the resistance came from [this] Resistor was a larger blow than if it had been from [anybody else]. I truly believed that this Resistor was beginning to see the light, and to think 'user-centered' – and then this. Even worse, when seen in connection with the trouble experienced [during another event]. It is clear he is under a certain pressure…but that should make him solution/result-oriented, wanting to freeze as many issues as possible. And then an hour-long discussion about something this relatively inferior. I'll have to start reading about organizational change to understand more…

Even in November, the weather however might change quickly. With a certain relief, the next entry in my research diary is just as positive and the former was unhappy:

Surprise! The afternoon was great! In a few hours, we moved from [Y in one mode], to [Y in another mode] - including the paradigm for [a particular function]..

I really could not let this particular episode go by, but kept reflecting about it:

03-12-2008: I've reached the conclusion that the Resistor has changed from design mode – being open, exploring options, and assessing them from a usability point of view – to implementation mode, where any initiative is being measured on a scale of 'how difficult is this to implement'?. I confronted him with this yesterday, and he didn't deny – but actually semi-admitted that this was so. This doesn't do, for a number of reasons. First, the obvious one, this is clearly counter-productive from a creativity/usability point of view, since it will hinder any rational approach to improvement of usability. Secondly, it is a self-imposed role he is taking on – I, at least, don't know of any official instruction that we should strive for reduced complexity, or ease of implementation. Of course, at the end of the day, the design must be implementable, but in this respect, it has throughout been the idea that first we design what we firmly believe in, from a usability point of view, and then we consider that design in the cold light of realism vis-à-vis implementation. Obviously, some items will not make it at all, and some will not make it for the first version, or even first versions, but the Resistor's attitude, official or not, leads to a third issue, which is much worse: The Resistor in not capable of making this kind of assessment any more! In the 'old days', that is, when we were using [a particular tool], the Resistor was of course the guru, knowing all. Today, when everything is coded in-house…and where the limitations in reality is set by the features included in, or available for [a particular new technology], the Resistor has in reality no idea of what is difficult, and what is not. This makes his intervention awkward, to put it politely, an irrelevant disturbance.

Admittedly, I was unhappy about this entire issue, and felt about to lose my patience, which is very much against my principles of leading the team towards consensus and mutual buy-in.

All of this made me make a somewhat rash decision: If the Resistor's resistance goes on unchecked at the next workshop; he will be asked to consider his motives very carefully. I already started on this by challenging him on the above assumption, telling him that if he is acting from an agenda that is not usability, but 'implementation-friendly', or (even worse) 'like yesterday', I cannot accept his participation. Ultimately, he will be asked to leave, for a short duration, or permanently if it persists (and the reason is as per the above…).

The gloom did not leave me, and, I suspect, this was at least in part because I had had faith in this particular Player, before he took on the role of Resistor.

05-12-08: Kept thinking about the 'Case of the Resistor', as I've come to name it. It is somehow so typical of conservatism, and it is starting to show irrational characteristics. We are discussing principles, or tradition. We are certainly not discussing usability. I wonder whether I've been duped previously, that he never really believed in the idea at all, but joined – or participated – from the viewpoint that he would be the guardian of tradition? If you cannot beat them, join them?

At this stage, my studies moved to the rescue, and inspired me to move on, to try something new, or to be 'mature'…

08-12-08: I decided to change [tactics, inspired by action research]. There is no doubt that the reflection earlier in the week is the direct cause for this decision – I need to work more at the meta-level, and gain a higher degree of insight even at this real-time level of the action. I hence spent most of the day with the Resistor, discussing his input to the upcoming workshop, and developing and agreeing design suggestions we both could subscribe to. This was fruitful, and also served to regain balance, and confidence in each other. I think it provided a good basis for the next days, and it made sure, at the same time, that he could not claim that the workshop didn't address the topics he needed…We prepared an agenda in that light, together, and I circulated it at the end of the day. I must admit, that I believed this was some sort of a new beginning, some light at the end of the tunnel. I went home quite cheerfully…

Maybe my intervention worked:

09-12-08: [System Z] Usability Workshop in…The Resistor and the 'Case of the Resistor' was not really an issue that day. I prided myself by thinking it was a success for my changed strategy, which the increased meta-level thinking paid off.

Or rather, it did not…:

10-12-08: This was actually a very efficient day… achieved in spite of the Resistor going into complete cognitive lock-up, out of pedagogic reach, over a subject that I believed to be trivial, and not really worth a fight. We decided on a fashion entirely consistent with everything else done so far.

Nevertheless, the Resistor dug in his heels, and became the complete 'NO'-sayer – but with no concrete arguments apart from the 'I don't like it' – ones.

It was a distressing situation. The Resistor was openly seriously distraught and agitated by the situation, and I was not in a much better state. I had reached my predetermined endurance limit, and was sorely tempted to act rashly. Somehow, I however managed to collect myself:

Nevertheless, it was back to square one, my revised action shot to pieces: that discussing and agreeing things up front works, but only if you don't forget controversial issues (or realize that they are there – this was completely unexpected). I resisted the temptation to simply kick him out, as I had previously decided with myself to do, but applied age-old experience (middle name can be Patience!), and called a break…

The incident continued during the break, however, which serves to demonstrate the depth and strength of the emotions involved in such undertakings:

[During the break]…we had a talk to unlock him – by then, he reminded me of the kids by saying 'Oh, don't mind me, just go on, it doesn't matter, you decide everything in any case' etc. – all of this in spite of a discussion we had just after lunch, where I found it necessary to stress that I DID NOT make decisions above the heads of the team, or unduly influenced the process, or the members – like the Supporter, whom I certainly could influence behind the lines to control the outcome of the process. He – the Supporter – actually commented that I was very open to input from all directions, and didn't misuse my leadership position to force my own opinion through. Thanks [Buddy]…☺. The issue was not really resolved – but the rest of the team agreed to the chosen solution, and the Resistor eventually seemed to accept the solution.

The aftermath of this particular incident introduced a new line of reasoning in this particular skirmish, or a new form of resistance, or argument, depending on the viewpoint: the invention of rules.

11-12-08: The morning after, so to say. The Resistor came mid-morning, and told that he had spent two sleepless hours the night before, because we (the Usability Team) had decided something that was in contradiction with 'an overarching principle' – in the current system, that is. A solution-oriented discussion took place between the Supporter, the Resistor and me [but] the solution-orientation however didn't last. During the discussion it rather quickly became clear that we were discussing principles – each of the suggested technical

solutions provided the same [quality], and that the issue really was one of personal preference, at least on the Resistor's part. Both the Supporter and I were able to argue our solution based on consistency with the previous decisions in the Usability Team….

The Resistor was however quite ready to sell consistency for tradition (which his solution represented), and, worse, it also became clear that the Resistor even wasn't immediately prepared to accept a user-driven decision process. While the Supporter and I agreed that the question should be put to the test, first in the team at large, and then, if need be, with real users, the Resistor frankly admitted that he wouldn't be influenced by the outcome, and would stick to his (own) solution, irrespectively. Frightening! Refreshingly, though, was that the Supporter immediately spoke his mind and told the Resistor to his face that if this was his attitude, he didn't have a voice in the team any more(!) (two souls, one thought), and subsequently told the Resistor to '…get back into the game'.

The creativity or inventiveness of the Resistor did not stop there, in this incident: leveraged resistance was evolved to include the voice of the management.

Another trick attempted during the discussion was the use of 'pressure from the side' as well as 'pressure from above': While the Supporter and I were busy doing other stuff, the Resistor had teamed up with [a colleague], one of our most respected and thus influential [members of staff], and either managed to get him to support the Resistor's viewpoint – or at least maneuvered into a position where the Resistor [could] claim that [the colleague] was supporting him. Covert opposition! On the second front, the Resistor told that the Manager had inquired about the last days (the workshop), and that his response was that they had been good, apart from this one problem. He then claimed that the Manager had forced him to outline the issue, and that the Manager had subsequently given him his full support for the Resistor's solution. Allegedly, the Manager should have said 'I will never allow them to change this'. Deeply frightening, from a number of viewpoints, both the process (using management leverage to get you way) and the idea that the work of the usability team should eventually be second-guessed, or overridden, by 'the management', knowing better than everybody else. I cannot help thinking back to Nielsen (1993), who has a whole section in his book called 'Vice Presidents are not users'! – old tricks die hard…

The entire experience with the Resistor could not help me considering the doing of research in your own organization, and how, to me, current literature (Coghlan & Brannick, 2005; Herr & Anderson, 2005; McNiff, et al., 2003; McNiff & Whitehead, 2006; Zuber-Skerritt, 2001) seems to gloss over these aspects of attempting to accomplish

change in a business environment, perhaps with the exception of Herr (1999), who describes how she is on the verge of being 'let go' from her position in a school, due to her desire to change the ways of the establishment:

It really makes you wonder…about doing changes…in a business project environment. One particular issue is the one of working on a timeline. If you do Action Research in other contexts, it may well be so that change can take the time it needs, and in such cases, convincing the Resistor, or getting him back on the path of virtue, would become an objective in itself. In the current context, it is vice-versa: Here, the Resistor is actually a threat to the process, and I don't have the time-wise luxury of humoring him endlessly. Removing him becomes an option that must be considered, like observed in an earlier entry – but it would do serious damage to the spirit of the team, and it is really against the way I like to do things. On the other hand, having an 'agent provocateur' sitting inside the team is problematic.

The issue could easily be extended to cover [another] Resistor as well, who I see as resisting as heavily as possible…but mostly passively: He allows discussions to go on, eventually to find a conclusion, and then often injects: 'Yes, but…', coming up with some technical issue that has the potential to blow the entire discussion out of the water. Playing fair, he could in most cases have said that much earlier, making the issue a constraint on the discussion, but he rather enjoys seeing me drown – or at least paddle like hell to avoid drowning. The passive resistance is at the clearest when it comes to offer no commitment, even when asked directly: He always reserves judgement, and seldom, if ever, actually says 'yes' to anything – a nod, not looking at you, is the most you can expect. Covert resistance.

This being said and done, I have chosen to conclude this particular tale here; a continuation, I believe, would merely reiterate the rest of my experiences into this dimension of Project Alpha.

I would however like to end on a positive note. Not only was Project Alpha a success in the Organization; the incidents, episodes, skirmishes and other skulduggery have ended amicably. Today, nobody is at each others throats, and the tomahawks have been buried. We are all the wiser due to the experience, and are perhaps even better equipped to tackle such situations, if and when they occur in the future. A final entry into my research diary somehow says what remains to be said:

07-01-2009: Had another talk with the Resistor, realizing that both of us are attempting to fill the holes in the tarmac, to repair. We get along just fine,

and the disagreement is now becoming an issue that we can discuss at a higher level: Why?

We agree, interestingly, that we ARE discussing principles, personal preferences. Christmas has also taken the heat out of the fight, which is also an interesting observation: Perhaps the tiredness and general feeling of being worn out before the holiday accentuated the gap, made it more difficult that it would have been, if the discussion had started now. Tired men make mistakes – a known fact – but perhaps tired men also makes too much noise (probably also a known fact).

At the personal level, or in this actual case, we will probably find a soft landing, where both of us can walk away without losing too much face (Chinese compromise), but that really doesn't change much: Action Researchers will be subject to this kind of covert resistance, and participants that use any and all means to preserve and protect status quo. The learning is that the action researcher must be prepared for such things, and must have the tools in the shed to deal with them (holidays count as a legitimate tool).

[Heuristic]: [Don't] budge…stand fast, and be pigheaded! Don't give in. Damn the torpedoes.

In honesty, however, I am not that tough, always.

14-12-2008: Spent a bit of time reflecting over the events during the week. The most powerful feeling is the one that change is really hard! This should perhaps not be surprising, also including previous experience, but is, nevertheless, considering the persistence and vehemence observed…[and] especially the doggedness required…

The Tale of the External Player

Blow-by-Blow

This tale starts at the very earliest of Project Alpha, specifically on the 4th of December, 2007, with an entry in my research diary:

> 04-12-2007: Went to…, to enroll the external Player in the project process.

A few words of explanation should be offered, to provide the necessary context and texture to appreciate this tale. When we initiated Project Alpha, we realized that did not have sufficient capacity, skills, knowledge and know-how within the organization, in a number of important areas required by the user centered design methodology. As is natural in this situation, we allied ourselves with a number of external partners we knew and believed in, and whom we were convinced had the competence we lacked ourselves: These are the persons collectively referred to as the external player, in the singular.

Of particular importance in this context is that we ourselves were inexperienced, in the practical sense, with regard to doing user centered design, and looked to the external Player for this expertise. Having contacted the external Player, some time was spent on negotiations between him and the Organization (through me), and on formulating a common vision, and the associated goals, responsibilities and actions applicable to Project Alpha. With the formalities in place, the first Project Alpha workshop was held, partly to team-build, partly to build understanding and respect across competences, and partly to ensure a common understanding of the role of each participant. Perhaps naively, I believed the event accomplished its objective, which a note from January 7th, 2008, confirms:

> 07-01-2008: The overall impression from the workshop is that this paid off. Everybody got the same introduction to the project, and there was understanding and acceptance of the various roles …

Shortly thereafter, we however found ourselves struggling a bit, methodologically and methodically speaking.

> 21-01-2008: Spent quite some time on discussing the method, where agreement was eventually reached on having co-discovering [expert] teams

evaluating both the task level and the communications level. While the latter was foreseeable (applying usability heuristics), the former was a surprise, and at the time of writing, it is not entirely clear what it is going to contain, or how the results are measurable…

This discussion resulted in the agreement that the external Player should formulate the method for the first few undertakings, notably the expert reviews that we decided to undertake, in order to capture the best parts of the current generation of systems, the pre-existing knowledge and know-how in the Organization, and with the ulterior motive of demonstrating that some aspects of the current systems could be improved on, from a usability perspective (see also 'The Tale of Team Jelling and Buy-in', starting on page 51).

11-02-2008: Reviewed the suggested Expert Review Methodology that the external Player forwarded. Found many holes, and is not really pleased with the result. It is much too open for my taste, and there is not really a clear metric to do the assessment by. Fear that the results may be relatively subjective.

My comments quickly resulted in a new version of the methodology, but the subject did not put itself to rest.

12-02-2008: The external Player sent his comments-comment on the Expert Review Methodology. I'm honestly not too happy… I …get the impression that the methodology is still quite a lot under development, and not a tested and fine-tuned thing. In that light, I decided to discuss further…

At this stage, it should be appreciated that time was slipping. The event on February 18th was the first of the expert evaluations, and we still had what I believed to be an insufficient method. We were, as such, flying blindly, and in spite of getting a clearer view, nothing was really settled, methodologically.

18-02-2008: Had a good discussion on the method, initially, which cleared up some issues, but in my mind, it is too open, too must-be-an-expert-to-use, in spite of the effort to push in the opposite direction…

It was part of the external Player's brief to report on the expert evaluation, which he promptly did, but…

23-02-2008: Got the preliminary report from the external Player. Thin. The Supporter thought the same. Need a bit of time to think more carefully about this …

This 'thinking more carefully' resulted in a bit of reflection, which I entered into my research diary on February 25th, 2008. As it transpires, I was starting to be a bit annoyed, a feeling that grew during the first part of March, 2008:

25-02-2008: Getting back to the report on the first expert review, the attitude of the external Player is still the same, slightly – or a bit more than slightly – patronizing.

11-03-2008: Used some time on the way and back to support the external Player in order to get the [review] report…to a level where it is useful. Not impressive…

13-03-2008: Prepared the agenda for the [next] workshop, the focus being to debrief with regard to the expert evaluations undertaken…the suggestion was agreed to by everyone – apart from the external Player, who were 'considering' it.

By now, things had crystallized somewhat, and I realized that I had to do part of the work myself, to achieve our common objective. It was also clear to me, at this stage, that I was paying the price for the poor preparation I had noticed already in the beginning..

17-03-2008: Continued working with the external Player on the expert review report, slow progress, but that is to be expected, perhaps: This exercise was poorly prepared, and he even didn't prepare the scoring scales that I asked for already back in February – because how can you otherwise assess? – this issue was crystal clear, and yet his reply to my comment was 'possibly 5-point scale - it will still be a qualitative analysis; calculating with weights for expertise is not really possible.' My reply was 'Probably true – but how to handle this in practice, then?' That never got any reply – but now, we are in deep sh…☺ Purely by luck, the Supporter (God bless him) sent me [scale…which could be used] to score the expert evaluation of Z….I sincerely wonder what the external Player would have done [otherwise]…

Things did not improve. During the second wave of expert evaluation, I reflected on the whole subject of the external Player:

26-03-2008: Choose your partners with great care! In the current case of the external Player, it is becoming obvious that he has something he wants to sell…which keeps popping up – just got another document…on that subject – and that the barely hidden agenda is to make us apply it to the Project, even if this is not anything we need. Maybe that is the reason for all the noise…

Things did really not improve.

28-03-2008: Second day of the…workshop. There is…often a downside. In this case it was the performance of some of the external Players. [One Player] is always a pleasure, and so is [another Player], mostly. [Yet another Player] I'm not keen about, and (maybe correspondingly!) he made no contribution on the second day. That doesn't do. [The last Player] I think has outlived his usefulness.

You can be polite, even to yourself. Or delude yourself. Or need time to cool down before you venture into action[16]. I certainly did all of that, for three full days; the heated March 31st entry in my research diary refer to the performance of the external Player on March 28th. One cannot help note the vast difference, from the 'correctness' of the 28th, to the bluntness of the 31st. The scales were certainly falling from my eyes, and my patience was exhausted.

31-03-2008: Had an email exchange with the external Player…[regarding]…the… workshop: On the second day, [The last Player] looked like he had a real…hangover, and he fell asleep during the morning session. [Yet another Player] enjoyed himself by reading the newspaper. This caused me to decide, unilaterally, that I didn't what to have these two guys on-board any more – not so much by the two incidents themselves, but rather this was the proverbial drop causing the glass to overflow…

From here onwards, the situation deteriorated rather quickly, in an increasingly animated series of emails – however following my decision to follow my heart, and continue planning without 'Yet another Player' and 'The last Player', a decision I communicated to the external Player in, admittedly, a somewhat inelegant way. Not surprisingly, that was noted in the other end. While the actual details are of no particular

16. 'Revenge is a dish best served cold' – reputedly a saying of Al Capone, the Gangster.

importance to this tale, I find my research diary filled with sarcastic remarks, and a note to myself:

> 18-04-2008: I should remember my own words: Choose your partners with great care!

This was a turning point in my relationship to the external Player, on various counts. I caused me to take over more of the professional responsibility for the usability process, and since I realized that I hardly was fully qualified and competent in this direction, it brought me much closer to the Supporter, who from this stage took over as the primary source of human factors knowledge in the multidisciplinary team.

It should furthermore be noted that my relationship with 'One Player' and 'Another Player' also improved following this skirmish, perhaps surprisingly. As such, I correspond amicably with 'Another Player' occasionally, and 'One Player' became an invaluable contributor and a permanent fixture in Project Alpha, as well as in Project Gamma. He will, undoubtedly, also play this key role in future undertakings as well as the maintenance of the current Product.

Closure and Reflections

As the reader of this tale, you might wonder about the purpose of including it in this thesis. Why is this important? The question is absolutely reasonable, considering that the importance I affix to the tale is partly in the aftermath, which is yet to be told: When all the dust had settled, in January, 2010, I told my view of the above events to 'One Player', who, in an edited form, I believe, retold them in his organization. To make a long story short, we agreed to meet, all of us, and close the subject through dialogue and reflection. This experience appeared to be valuable to all involved, and certainly to me.

Let me begin by noting that I have great respect for the external Player, and when I initially contacted him to become involved in Project Alpha, it was in the expectation that he had the practical experience with the process that I needed to 'pull it off'. I was certainly unsure and insecure, methodologically, never having done UCD in 'industrial strength'; my experience being limited to research-grade UCD. I needed the external Player to guide me, and the Project Alpha Team, along the rocky path of usability. I thought I made that clear, and

that it was well understood, but in hindsight, I might well have failed in the complete explicitness of this expectation.

Then there was an issue about wanting to work together: The external Player wanted to work with the Organization on Project Alpha, and, due to that, avoided to be explicit about not actually having the sought-for practical UCD knowledge and experience, but only the theoretical ditto.

We were, as it were, in the same boat, both insecure with regard to the method we should use. As is clear from the diary entries above, as well as from 'The Tale of Team Jelling and Buy-in', see page 51, we spent considerable time on 'designing the plane while flying it', and in turn, that caused considerable impatience in the more practically-oriented Players in the Team – frustration, I imagine, which could have been avoided if we had been able to stand up at the very first workshop and tell them: 'This is how we are going to do it'.

In way of learning, apart from the obvious and ever present issue of clear communications, and the pitfall of lacking it, it is tempting to advocate the following heuristic:

Heuristic: 'Have your method ready, and well understood, before you begin'.

Another issue is of potential interest: presumption. It transpired during the 'peace-conference' that the external Player assumed I would have turned them down as a Player in Project Alpha, had I known that he lacked the practical experience. As it is, I would not, which I told him at the January 2010 meeting: due to the respect I have for the external Player, and being convinced that if he did not have the practical experience, nobody in the world would, I would have entered into dialogue, and made the method development a part of the assignment, or a shared assignment between some of the players. It would have been enlightening for all of us, and would have saved the frustration we encountered for the more practically-oriented Players.

As a closing remark, nothing is so bad that it is not good for anything. Or nothing is black and white. I can not help asking myself how we would have fared, if we not (by this chance) had had the gradual transfer of usability knowledge and usability concepts, from the Supporters to the Resistors, during these early workshops?

True, the slow progress in the beginning caused some irritation and impatience, but there is little doubt that the collective multidisciplinary team must have a common base of usability

knowledge, a learning I brought with me from earlier experience. The first workshop in the Team, held in January, 2008, was designed to start that process.

In hindsight, the time set aside for the purpose was probably (certainly, more likely) insufficient. The initially slow progress made up for this error on my part.

Furthermore, the overt development and experiment with the method gave everyone a 'playful' introduction to working with usability, including a slow and gentle introduction and build-up of usability concepts and skills. It was, admittedly, caused by the methodical uncertainty, but we would never, in my view, have succeeded with this kind of knowledge transfer, if it had been centered round the 'real work': From the reactions we had, later in the development, when real change loomed (see 'The Tale of Team Jelling and Buy-in', starting on page 51, as well as 'The Tale of the Resistor', starting on page 65), it appeared that usability becomes threatening to some when it becomes serious, when it is not a 'game' any more, but when we are 'playing for keeps'.

Perhaps, by serendipity, our haphazard method development process managed to circumnavigate that particular abyss.

The Tale of Success

Reader's Note

It is perhaps not surprising, if the first three tales of Project Alpha has left a bitter-sweet taste in the mouth of any reader who has managed to get this far – if indeed any – or maybe even the taste of deterrence, or eventually defeat.

Thus while understandable, if it is so, the 'Tale of Success' should change this, to demonstrate that the effort, and sometimes hardship, was worthwhile. But which success, you might ask, or for whom?

As for everything else, there is no single, clear answer to this. For me-the-researcher, the autoethnographer, or reflective practitioner, the success of my field trip is in broad terms my own learning and professional development, and it is upon this knowledge I eventually will attempt to answer my research question. This perspective on success corresponds to the way I have defined outcome validity, or workability, in the section about 'Quality Concepts in Self-study Reflective Practice', which starts on page 159. To measure success as personal development, I further argue in that chapter, is not narcissism or self-indulgence, but a view that is rooted in the nature of auto-science.

In the case of Project Alpha, however, I suggest that the perspective of success is different, and with it, so is the demonstration of accomplishment. I believe it is important to recall that Project Alpha was conceived as an industrial project, entirely independent of my academic ambition. In popular terms, Project Alpha is the dog, and I, the autoethnographer, am the flea sitting it its fur. As everybody hopefully can agree, the success of the dog and the success of the flea are two very loosely coupled concepts: If the dog is successful, the flea may also be so, depending on his own effort – but it the dog is fatally unsuccessful, it may well be that the flea suffers the same fate. Do not be confused by the fact that I, the Project Manager, am the dog handler[17]…!

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17. This perhaps playful remark glosses over the very persistent identity problem I had during the first phases of my research, keeping the flea and the dog handler apart. When you are deeply immersed in your particular field, studying the natives, it is immensely confusing to be

This particular tale is about the dog.

If you embark on user centered design, I suggest it is important to realize that this is not just a methodic change, but also a cultural change. It will, as the previous tales demonstrate, affect the members of your organization in a significant way. It is always debatable by which success criteria you want to judge a change, and in many cases, they could relate to achieving a certain outcome.

I however suggest that a more fundamental success criterion for any change, in any organization, is the question of permanence. I venture that if a change does not become durable, or self-sustaining, it is not successful.

I have chosen to impose this criterion on Project Alpha, at the basic level of changing the organization to become user centered in a sustainable way. Getting to this level corresponds to achieve critical mass, and subsequently, one should be able to 'lean back' and observe a self-propelled continuation of usability thinking. Such an outcome is in my view a reasonable measure of success 'at the level of the dog', and as I see it, it corresponds without qualifications or adjustments to the concept of catalytic validity as this quality measure is described by McNiff, Lomax and Whitehead: Catalytic validity is achieved by showing that "…your influence has been educative for the people you are with" (2003, p. 136).

Thus, this tale 'about the dog' is about noticing, assessing, and being pleased about Players adopting the stance of user centered design, and the thinking patterns of usability and user needs, and through that, developing from being Players to become Supporters.

In most cases, the research diary quotes used in this tale are allowed to speak for themselves, with little of no 'glue', and no interpretation. This is not due to laziness, but in an attempt to fight bias, taking note of Herr and Anderson (2005), who warns about delusion when it comes to judge the importance of one's own achievements:

> both the object and the subject of observation. Clarity, as far as I was concerned, came with the maturing of the research question, and through that the appreciation of whom and what I studied. Even at the time of writing, I can still find myself having to consult the research question occasionally, in order to direct my focus in the proper direction.

> "We find it is difficult and perhaps deceptive to attempt to separate the study of one's self and practice from the study of the outcomes of actions initiated in a setting. If a researcher is studying a program that is his or her 'baby', then the tendency for self-promotion may be too great to overcome" (2005, p. 33)

'But this is exactly what you do', you might exclaim, but my answer to this hypothetical question would be 'No, it is not. My findings are not relating to the outcome of Project Alpha, or any other particular project, and my object of study is not a particular project, but how I interact with people while undertaking such projects. I hope to increase my understanding of managing user centered design, and to learn about the traps and pitfalls associated with the change it causes. Whether such projects eventually fail or pass, I would think, is rather irrelevant: there is equal learning in both. There might even be more learning in failed projects".

This being said from the 'perspective of the flea', I am of course also interested in the 'fate of the dog', in order to demonstrate that UCD is doable in a business environment, hoping to inspire more organizations to do more user centered design. This brings the discussion back to the danger of 'self-promotion'. I agree with Herr and Anderson that the danger is real, and you will find that the subject and avoidance of self-delusion is discussed rather extensively in the section on 'Dialogic Validity in Insider Action Research', see page 149, and the section on 'Quality Concepts in Analytical Autoethnography', see page 136, among others.

As a further safeguard, I refrain from synthesis in this tale since a reinterpretation of my notes could be seem as an invitation to brighten the outcome of Project Alpha. Hence, I am simply using the 'unfiltered' notes from my research diary, which, with reference to the chapter on 'Construction', see page 40, is as close to the 'truth' as I am ever likely to be. I suggest this mitigates the relevant concern argued by Herr and Anderson (Herr & Anderson, 2005).

Happy reading.

Extracts from My Research Diary

27-03-2008: First day of the…workshop…an interesting issue came about during the [analysis], when I ventured to a Doubter that we lacked domain knowledge. He got quite upset – and it took a while before I got it made clear that while we know everything there is to know about our product subject – we don't necessarily have maintained our understanding of context-of-use, which keeps

changing continually, but which we don't monitor in any systematic fashion. Quite the contrary, actually, we just believe that our know-how is intact and current. He didn't look happy – but, a month in retrospect, he offered the same viewpoint to somebody else, with me accidentally overhearing it.

04-08-2008: Was buttonholed in the hallway of the R&D department by [a colleague] and [another colleague], wanting to discuss HMI! Notably, this was not a Project Alpha question at all, but rather perhaps the first '[ESP]-is-the-usability-department' question ever asked…

05-08-2008: I'm amazed. Second day in a row where a usability question is sent my way. This time, though, from the Player, who knows more and more, and who is subjected to the influences of the usability team…The important thing is however not so much the subject, but the fact that he cared to ask in the first place, which points to a growing awareness in him – and, in modesty, in me as a discussion partner on this subject.

02-09-2008: Had [a Client] coming in…for the very first pre-official dry-run presentation of the Project Alpha HMI. A very useful experience, that was…In my own view…what really, really worked were the full-size cardboard prototypes. Five of those and some of the primary…menus and information fields, and the play was ongoing immediately. [The Client] often sat with one of the cardboard screens in his hands, and used them. When he clicked on something, I could show him the result, and we could discuss the way it worked…

This being said, [the Client] was sold to Project Alpha, especially on the point that we had chosen to go the [particular technology] route.

In the light of the experience, I'm first and foremost very happy indeed. Good to get honest feedback on what we have done in the usability team, great that it was so positive in the general sense. Another very important thing was that the Manager was present during the session: First of all, it gave him the opportunity to really have a look at what we have done (not resulting in adverse comments), but much more importantly, he witnessed [the Client's] very positive attitude, both to the process and to the suggested produce. Seeing this was probably a significant confidence booster for the Usability Team at large, and the approach selected, and probably a welcome one as that.

17-09-2008: Had a nice discussion with the Player, who is becoming usability-like. The topic was a detail in [some tool], but the process of reaching the conclusion was the interesting part: By discussing how it was to be used, and by applying a consistency consideration, comparing with other similar controls in the tool, we arrived at a 'nice' solution. Afterwards, we also discussed the process, and I pointed to what we had done, which met with dawning realization in

him. We also discussed whether this 'usability stuff' was more on the agenda 'these days' than previously, and he (not surprisingly) admitted that Project Alpha was moving things in this direction.

22-04-2008: …[after the workshop] I had a quiet talk with the Player, who actually started it himself by saying 'today was good'. Yes, it was. We agreed that yet another round was won, without selling short the principles of the HMI design, while actually transferring culture to the rest of the crew. I asked (dirty me, hidden agenda) whether he believed we were gaining understanding among the [staff], and he ventured that 'yes, for sure, the aha experience will happen to all of them sooner or later'! This means two things: he believes we are on the right track – but [also that] he, himself, is firmly won over to the 'cause'!

29-04-2009: Had a very full day with the Player and [another] Player, going through all the changes, add-on's and ideas generated for the HMI over the work of the last period. This was, from a research point of view, interesting in the sense that [another] Player is not used to the methodology of the Usability Team – and behaved, in the beginning, a bit like a bull in a glass shop: He had an idea, and that was to be steamrolled through, not allowing anyone to discuss principles, consistency or anything else; he was just looking for rubber-stamp approval of his own suggestions. That changed very rapidly: I wouldn't let him, and made that clear. After putting this mark on the territory, everything calmed down, and we made a lot of productive work. All three of us were happy, and [the others] said so, without any request from me.

30-04-2009: Followed up a bit with [another] Player on the day before, where I in some side remark had ridden my hobby horse of 'engineers not caring for human factors'. Apparently, that had struck, and he had reflected on the subject, probably feeling a bit put off about it: In his view, 'they' – the [staff] in the department – had always thought a lot about that…

Nevertheless, I told him a bit more about what I consider as the most common developer 'disease': Believing you know what the user wants, and acting on it, rather than asking. [another] Player remark: 'Yes, that is true', meaning that this is indeed the state-of-affairs in [that department]. His own behavior the day before bears full evidence of this fact. He had solutions, and wanted to go right ahead, no discussion or questions asked.

He was however learning fast, and also said 'Next time, I want to be a member of the usability team'…

25-05-2009: The Salesman came by and told about the reaction from the [Client] showing. There was not a lot of news, they really liked the system, and, having seen it, didn't want the old stuff for their demo-room…

18-06-2009: Another day in the office. On such a day, there is really nothing to report; the job consists of looking after the project, and talking to the guys. And then, when you care to step just one little step back, every day contains usability issues…

The afternoon also contained a design session, however a bit more formal: I sat down with [a Player] and [another Player], looking at the [a particular layout]. Most got changed…

At the meta-level, it is interesting to note that this was taking place as a small group exercise, using the fancy equipment of paper and pen, discussing, changing, discussing, changing. The atmosphere during these sessions is invariably amicable, and I'm certain that the involved people enjoy it. Everybody certainly speaks their mind, so it is cooperative design in a true sense…

Like [a third] Player said the other day, when I was on my way out of the office again, and joked that 'now there will be peace', his reply was 'but then there is nobody to discuss [usability] with…☺'.

When I sum up on that, even if I fail to record it on a blow-by-blow basis, this is evidence of a sustainable change of the culture. I don't have to go round to yell…the crew has realized that usability, and especially the HMI part of that, is something you don't just do; at least, you sit down with a group and discuss, sketch, implement, play with it, and then change again…

14-07-2009: In spite of holiday etc., I went to the office for an all-day conning-design day with a Player, another Player and a third Player. That took us through the Player's original document, and progressed the previous…design a good bit. Why is this important in the current context? The answer is the Player. This Player has been exceedingly resistive, all the way back from the autumn of 2006, where we had the false start of the usability team…It was this Player who said 'but we have been doing this for the last 20 years', and more to that effect. It was this Player who came back, unconvinced, and perhaps even unaffected. And yet, by the power of voodoo, or, more likely, by watching the work of the Usability Team from a distance, this Player seem to have come to the conclusion that it is not useless after all: He is, at least, playing the ball, and participating with a good will.

14-08-2009: Spent the entire day…talking [system Y] HMI details all day long, adding features (or rather, deciding on where to put them in the HMI, how to control etc.). That is in itself positive, not much HMI development goes on without the Usability Team (or a few local representatives of it) being in on it, or directly in the drivers chair…

04-09-2009: While we were testing Project Alpha in the lab, it was also presented at the International Sales Conference. I was obviously not participating, but was told that Project Alpha was presented at four one-hour sessions, each with 20 – 25 persons participating. At those sessions, they saw the Player demonstrating Project Alpha on a very large display, and hence became familiar with both the look and feel of the HMI, but also of the overall functionality. Three persons provided feedback on the outcome of these sessions: The Manager, The Sales Man, and The Player. Interestingly enough, their feedback matches their personalities and ways of expression very well, leading to the understanding that they essentially said the same thing, though with different words and expressions:

- The Manager (true to his position and his upbringing) said: It looked impressive on the large display, and went very well – nobody complained.
- The Salesman (forever the salesman) said: It went very well, and people were enthusiastic. We will get a lot of support from our agents and sales staff. They are convinced we have the right product.
- The Player (the more flamboyant type) said: It went super fine. They [the participants] can't get their arms down…

It is difficult to see this as anything but an unqualified success for the work of the Usability Team. At the meta-level, however, it is much more important that usability is finding its way into the [product presentation] at all. This is an action-research result: All the canvassing I have been doing on how to sell usability, by telling the story, rather than by comparison to earlier or competitive products in a comparative, qualitative form, is paying off. The product flyers will also have a note on usability, which I have suggested to say the following:

> User Centered Design
>
> The Human Machine Interface (HMI) of the Project Alpha is a story in itself. Understanding the need for easy and safe operation across systems and applications, the Organization has pooled its 30 years of experience with that of leading international human factors expertise. Working together throughout an ambitious User Centered Design process, the result is an HMI that is intuitive, transparent and consistent. The HMI supports both novices and expert users, and is designed to match the User's information needs. By following operating principles similar to those of modern browsers and major software packages, the Project Alpha HMI will be immediately familiar to any

computer user, and the easy overview and simplicity of operation directly allows the user to concentrate on the task of navigating the ship safely.

Stay tuned…

15-11-2009: Thinking back over these past few months, one thing is very clear: Usability has caught on in the Organization, or at least in my part of the woods. It also has the potential to go the whole nine yards, judging from the reactions we get from here and there. I think the nice remark from the [conference] chairman, while perhaps just polite, nevertheless contained his impression: Project Alpha will be a success. The Players feedback from [the exhibition] tells the same story: approximately 70 clients talking to him about the new system, leading to 20 exclusive presentations, and all positive feedback ('You are going to sell a lot of this…') – apart from the inevitable rotten apple being doubtful about…

The user trials show the same thing: A positive overall attitude, no real negative, general comments, but of course a lot of details to straighten out…

Achieving success however does not come for free.

09-12-08: Usability Workshop in…. Most of our small team spent the evening [together]. We had a number of good discussions over dinner, reflecting on the day. I was still a bit sore from the long and (again) confused discussion about [details] with the Doubter, but we all agreed that it really is 'no pain, no gain'. The day showed it clearly – when things becomes painful, it forces you to really invest, spend energy, be enthusiastic, be involved, and have feelings and knowledge, incentive, at stake. The pain becomes a measure of seriousness and dedication, certainly. It is easy to check on oneself – after a day like that, you are spent. Not much gas left on the tank.

This in turn translates into something else, at the meta-level: If you are leading the action, leading the change, you not only need to have the (leadership) qualities required to conduct such sessions, you need to have mental energy, stamina and patience as well. You MUST believe in the cause, and act accordingly; otherwise you will give up, and let more strong-minded, or more well-rested, team members 'win' discussions, even if their arguments are not fully convincing or well founded. Such an investment is really an expression of the Action Researchers values, and his or hers need to live them…

Project Beta: The Bridge Layout Case

Reader's Note

Project Beta was, as noted previously, a short, 'simple' action. It was undertaken at the initiative of a Client, and it is significant to note that the Players in Project Beta are different from the ones in Project Alpha, apart from me and the Supporter, whom the Client however never met face to face: There is no other cross-contamination between the two projects, and the experiences and reactions conveyed below are as such independent from Project Alpha, barring my influence and potential bias.

The tale is as brief as Project Beta itself, and is included to add validity to two points:

Firstly, how sensitive, or careful, I have become when it comes to talk usability to technical staff, having come to realize that they appear to lose interest quickly, and perhaps that they are somewhat disinterested right from the start.

Secondly, up an entirely different alley, how the doing of a little bit of human factors engineering, which is completely insignificant in terms of cost, can have a lasting, beneficial effect. In this case, a whole series of new ships will have what I seriously believe is a bridge layout that suits the operators, a benefit that will last at least a decade, and perhaps longer.

Since the story about Project Beta is also a kind of 'success' story, I have chosen (as was also the case in 'The Tale of Success', see page 81) to let the research diary entries speak mostly for themselves.

The Tale

23-02-2009: Had a meeting with the Salesman and the client 'Astra', which have [many] ships on order. Simple agenda: Please help us design a standard bridge we can fit to these ships.

During that meeting, we told them about the work we had done on Project Alpha, however applying the learning we had: Do not lecture Human Factors; it is usually not appreciated by technical personnel. Nevertheless,

the 'Astra' representatives became a bit 'scared' by the (academic) approach, even if I kept it very simple and down to earth, and simply asked that they gathered a couple of captains, and talked it through with them. They were afraid that it would take too long (they were, as is usual, under time pressure, they said – the story shows actually differently, they had reasonable time to have done this) etc., - all the stories we have heard before. I wonder if it could have been sold even simpler. Maybe it would have worked if I had volunteered to do the job for them: Give me a few captains, and we will provide you with the design. No details at all. No mentioning of all the soft stuff…

27-04-2009: Spent most of the day on doing bridge (re)design for 'Astra' – in preparation for the meeting…with [the supporter] tomorrow. Interesting 'to go back' to this part of the HF – and I realize again, that I have learned something: Anthropometrics, grouping of information etc. – it flows quite naturally, but more importantly, I don't feel insecure about it. Let's see tomorrow; maybe I'm just getting too big for my shoes, but I believe (right now) that my suggestion is much better than the Owner's suggestion, and very much better than the Organization's baseline.

28-04-2008: Spent the day (effectively, afternoon) with the Supporter, first and foremost discussing the 'Astra' Bridge, very fruitfully. We took the Owner's original input, used the Organization's baseline as 'cardsort' input, and evaluated my first suggestion in this light. This caused a further focusing…[which] will be presented to the client…but I think it is a very good suggestion, and I will be much surprised if it is turned down. Considering that the Client's representatives are engineers, it is however interesting to gauge their reaction – will be very engineering-like, just accepting it at face value (basically being disinterested, or not having an opinion), or will they be more attuned to the real issues contained in the suggestion, and offer involvement? The final possibility is of course that they will completely close their eyes and ears, and stick to their own original design – which will be a learning it itself, and very interesting as well, especially if the reasoning can be made clear.

05-05-2009: Spent a couple of hours with the [representative] of… 'Astra', talking him through the suggested bridge layouts previously prepared. A very constructive dialogue it was, which lead to a few changes in the layout, but the overall ideas of [the concept] survived without any discussion, even though the question of an operational concept was raised many times by the Salesman and myself.

In terms of acceptance, the response from the owners was 'in the middle', meaning no blind acceptance, but, on the other hand, not resistance either. Actually, the questions asked were reasonable enough, but mostly they

concerned the rationale behind the placement of the various groups. There was no argument concerning the overall philosophy of grouping the controls as shown, nor the issues of physical ergonomics…

I hadn't prepared a comprehensive presentation, but had decided to talk through the issues in a low-key fashion, in order not to 'convince' anybody, or 'sell' anything…It will be interesting to develop this further, also the way this message is being delivered. I firmly believe that people should draw their own conclusions, rather than having it rammed down their throat: The way to sustainable change is through one's own decision-making – which is exactly the same strategy promoted (by me) for Project Alpha marketing: Tell the story, and leave the evaluation of benefits to the client (at least most of the way; today's story stresses that the delivery of the story should be clear, sufficiently comprehensive, but unbiased).

A daring guess is that this will work. ['Astra'] will 'buy' the concept, and build it…

They did, actually, after some technical hiccups and negotiations between the stakeholders.

09-09-2009: The 'Astra' bridge [design] is shaping up, finally…Got the [final] design for the [particular series of newbuildings] bridge design [which will be delivered] – things are really moving in the right direction.

Project Gamma: The Instrument Design Case

A day in the Field

On my internal clock, it is already 7pm, but the local time is just 10am. Having been airborne most of the day before, flying around half the world, I am jet-lagged, but in a strange elated way: I am feeling good, and in a relaxed, talkative mood. The reason, I think, is partly because I have been looking forward to this occasion, and partly because I know I am well prepared.

Mostly, though, it is perhaps because I have decided that I do not want to sell anything today. The usual pressure is absent. Today, I want to learn what they do in this company, and how they do it. I want to explore their experience base, and understand their rationale. I want to appreciate how they got to where they are, and what their vision for the future is. I especially want to learn what they think of our potential cooperation and how far they are prepared to go in this direction – or in particular, I want to learn to which extent they are ready to introduce human factors in their products and processes.

To support this exploration, I want to explain how we are doing things, and what our thinking has been until now, which benefits we think we got from user centered design. I want to show them how we may be able to help them accommodate their particular needs and requirements, but first and foremost, I want them to understand the values and objectives we have regarding usability. I believe that unless they get, or share, or build up such values in earnest, it will be difficult for them to perform and conclude a user centered design process successfully. On the other hand, if they do, I expect our potential cooperation to be harmonious and free of tension.

I'm very aware of my agenda in this respect: their adoption of the principles of Human Factors Engineering must be voluntary, and they must realize and appreciate the upsides and flip-sides to make an informed decision. Once they do, the joint venture becomes one of a more practical matter, transferring method and knowledge, which is the stage all we really want to get to – but not blindly.

The sun is already burning outside, but the blinds are drawn, and the conference room is quiet, shady, and cool. It is also typical of the United States as I know it. The furniture consists of a long, ellipsoid table and perhaps 10 comfortable leather chairs complete with rollers and all sorts of adjustments, video conferencing equipment, and a whiteboard. Air conditioning is softly whirring. The stage is set.

The participants join me and my immediate host, Pisces, who is the project manager of the development we discuss here: Aries, Antila, and Draco. Aries turn out to be from close to home, and we exchange greetings in our native language briefly. Heart-warming, indeed, and conducive for what is to come. A little later, we are joined by Gemini, who is the technical director of the company, and whom I have met before.

All accounted for, we introduce ourselves.

Pisces is middle-aged, and has joined the company a short while ago. He is a very seasoned project manager, but non-technical.

Draco is also middle-aged, and holds a PhD in a natural science discipline. He has however worked in engineering-oriented practice for a lifetime, and is employed as a software developer. He seems very competent in that area, but he is also new to the company, having joined just three months before. Draco is the person who will eventually have to implement the Human Machine Interface (HMI) of the application we are discussing.

Antila is in the same age group as the rest, but has a ten-years plus background in the company. He is working the practical side of the business, and is the guy you send into the field when something goes wrong. He is an engineer, through and through, and appears to be both very competent and very comfortable with his position and know-how, but a bit on the quiet side.

Aries is a bit younger than the rest, but has the longest history in the company: He joined 12 years ago, and it is clear he is the spider in the middle of the web. He has been instrumental in the development of the current product, and he will lead the development of the next generation as well, with Pisces doing the actual project management, and Draco doing the coding. Aries also holds an engineering degree.

Gemini. His is of the same age as Aries, and a business person as much as he is a technical person. He will be looking for the business advantage of what we will be discussing, and let us know right away that the time-to-completion of the development project is more important than a particular set of improvements. He let it become obvious that he is also under some – a lot, actually – of pressure from ‘above’.

Finally, myself. Age-wise, I am a little below the age bracket shared by Pisces, Draco and Antila, but older than Aries and Gemini. I stress my engineering practice track record, and my research and development background, which objectively is both relevant and substantial in the actual case. It turns out during the exchange that I am the only one with formal domain knowledge in the engineering field for

which the application we are discussing is intended, and I am clearly the only one with a social science inclination. Guided by previous experience with settings as this one, I do not tell that I am studying for my PhD in Human Factors in parallel with my everyday engineering career, but simply that I have a long standing interest in this field, and that I have 'read a few books' on the subject. In the actual case, this is OK – they see me as the go-between between engineering practice and the real Human Factors experts that we are suggesting are brought in to support the development.

I however, cautiously, ask whether any of the involved have any formal schooling in social sciences, specifically human factors. The answer is silence, until Pisces with a grin says 'I probably took a course in high school'.

The meeting moves on. We fine-tune and agree the agenda. We discuss, and, most importantly, agree that we have to go through with the cooperation, and they discuss and confirm that they really do want to fit into the framework we are offering them. I warn them several times, as I have previously warned Gemini, that this will mean some internal discussion, and a certain challenge of sticking to this decision, in spite of the resistance and the attempts at subversion that experientially is bound to happen as they start to do user centered design in an engineering practice environment.

We discuss the outcome of an earlier session I had with Gemini, where it was arranged that they should seek user input to their requirements for the new system. It turns out that they really not have done this, but limited it to a few phone calls. I get the impression that they have asked what the users want, and not what they need. Furthermore, I get the suspicion that they have also been asking leading questions, meant to confirm some of their prejudices relating to how their system is being used: They keep stressing these peculiarities during their presentation, like wanting to settle this once and for all. Sentences like 'Our users will not want this changed' and 'People are used to it in this way' are offered when I gently poke a little. I am not shown any kind of evidence in this direction, though, and I am not shown any kind of resulting analysis. There is vagueness in their replies, and Gemini tells me that the results are 'not really structured'. Antila, who supposedly has been in charge of gathering the user input, is more silent than usual during this part of the meeting.

The apex of the day is the session we have in their workshop. Here, they have a large system more or less ready for shipment, and by a stroke of luck, it is hooked up to a simulator. This means that we can

enact the operation the system will later see, when it is deployed. Starting out by watching and having the basic functionality explained, I rather soon put myself into the position of the user, and start to operate the system, while I comment on what I do, what I think I do, and how the system surprises me. And it really does.

During maybe half an hour, where I play the user, using my engineering background and my domain knowledge, I nevertheless find perhaps a usability issue per minute.

An interesting polarization happens: Draco, who has spent the last three months on trying to figure the application out, joins my running commentary immediately, and starts to supplement with the things he until now has failed to understand. Pisces, without a working knowledge of the domain, can easily see the more fundamental questions I raise, and chip in, he himself finding similar problems.

Antila is very silent, but is shaking his head with a grin. Gemini is on the phone, and does not participate, but Aries is taking the lead on explaining and answering my questions and comments, good humored. Actually, the entire séance is conducted in an atmosphere that is nothing short of bantering. We have fun, we enjoy ourselves, and it is not really very serious what is going on. Everything is friendly, and nobody is protective of the current system, or its heritage. I follow the mood and use language that is appropriate in the occasion, saying things like ‘oh, this is really terrible’, but with a big smile. I clown a bit, but so do we all.

At some stage I find a display that is really nonsense to me. It is a small-sized table of three rows and five columns, the fifth column containing the row-wise sum of four initial columns. All the numbers appear to be in the range from zero to maybe two hundred, and are given with one decimal. They are constantly changing, perhaps once per second. I ask what it is, and Aries explains that it is a very important display: Each column contains the individual values of a force balance, and when added up, one can compare the total force in one row with that in the other rows. Experienced operators, he is explaining me, will judge the totals and the individuals to assess overall performance. I roll my eyes and ask him whether he is serious: How can a guy take in twenty numbers that changes once every second, and make meaning out of it?

I slip in basic human factors knowledge, like the human mind only having approximately seven chunks of short term memory. Aries immediately gets the point, and realizes that a graphical display of some

sort could convey the same information, but demand just a fraction of the mental workload to utilize – at least he says so.

On the way back to the conference room, Draco takes me aside and tells me that this display is actually Aries' particular baby, something he is very proud of…

The session in the workshop is also instructive in another way. Some old equipment, two generations back in time, is stored in a quiet corner, and there I immediately can see the heritage of the current version. In the old days, they have used mechanical push buttons to operate the system, and the current user interface is still using the push-button philosophy, right down to illuminating people's choices, corresponding to the little lamps they used in the mechanical push buttons. Hence, what we are looking at is really a glass-version of a twenty years old mechanical mimic-panel, with some graphics and calculated results added.

It is difficult not to comment on this, and I do. I tell them I can see where their current HMI comes from, and they confirm it. I ask them whether they have really checked this HMI in operation, and they confirm that they have not. They admit that simply substituting buttons with a screen might not have been the best of solutions – but Gemini, which his business focus, reminds me that 'this HMI has sold a lot of systems'.

What I think, but in this case do not say, is that this is a conclusion that even on the best of days is doubtful: It could well be that they have sold a lot of systems in spite of the HMI, rather. Without going into the field, in some sense, how can they know?

We are spending the rest of the day discussing our development, but from a very practical point of view, in terms of 'who did this', 'how long did it take', and 'how many were involved'. I tell a bit about the process we followed, but I do not couple it to the theoretical model that is in the background. Rather, I tell them about our workshops, how we are using external experts in conjunction with our own domain experts, and how we managed to set up and work as a multidisciplinary team. I keep stressing that we would never have been where we are now, unless we had followed a user centered approach: We would certainly have had an HMI 'designed by engineers for engineers', and not an HMI 'designed by users for users'.

We round up by discussing and deciding how we will organize our cooperation, and the split of work. We discuss a common timeline, and the challenges we face here. We agree that they should spend some more time on their requirements, and that we should bring in the same

team of external experts we have used until now. We are planning user centered design on their behalf like one will plan any other project.

At the end of the day, Aries says to me in our native language, sure that nobody can understand: 'You are a fresh wind here, something we really need'. This is really generous of him, especially considering that I trashed his favorite display during the workshop session.

Aries' remark is a sort of a yardstick on the day as a whole: It went very well, much better than I had feared, even better than I hoped. It seems clear to me that they have taken the important points to heart.

Another day in the Field

We start the next morning by consolidating. Walking at 5 am, which is rather late considering my body's own timekeeping, I have made a slide cementing the findings of the day before. We go through it, and everybody agrees – even Gemini, who missed the last part of the day before because of other commitments.

At this stage, victory, if I can call it that, is close. Everything is set. And then I really nearly blow it all away.

It has been part of the agenda for the meeting that I should tell them more about our process, and since the process is governed by ISO 13407 (1999), a brief introduction to this is part of the presentation I am giving. I am however beginning with the beginning, and tell them about Human Factors epistemology according to Meister (1991), and how the center of Human Factors relates to behavioral-physical transformation. I give them Krug's (2006) definition of usability, and discuss it a little bit. I tell them about Human Factors as a science, and the way it is removed from engineering practice (Bella, 1987; Koen, 1985) – and hence why we had challenges to overcome in our own development. I tell them about the potential disastrous outcomes of poor usability, using the accidents of the Royal Majesty (Lützhöft & Dekker, 2002) and the LT CORTESIA (BSH, 2009) as typical examples. I tell them about the attributes of usability (effectiveness, efficiency and satisfaction), and I tell them about the work we have been doing, but on a more theoretical level. I tell them about gathering user requirements, and how ethnography might have a place here (Bader & Nyce, 1998). I balance this with the practical work done in co-discovering teams, and I show a lot of pictures.

And I see the eyes glaze over, politely, but even so. I see worry. I even see a loss of faith.

Realizing that I might be losing the advantage gained the day before, I wrap up as quickly as I can, and because I am the way I am, and do not believe in suppressing discussion, I put the question directly: 'Does this sound sensible, or is it bullshit?'.

Aries, Draco and Antila are quiet, but Pisces speaks for all of them when he says: 'I can't see this happening in real life, not with the commercial pressures and time-lines'.

Making Sense

Pisces' reaction is interesting. The presentation given on the second morning did not add to the scope of the potential joint venture, or to the complexity of the development we discussed. It only added background – but that background obviously was deterring, intimidating, in itself. The knowledge they gained from the presentation forced another perspective onto themselves and their practice, and challenged their engineering practice worldview which Vaughan describes as something that "survives despite evidence that repeatedly challenges its basic assumptions" (1996, p. 196).

By seeing behind the facade of Human Factors, as opposed to the view the practical demonstration given at the first day of the meeting provided, the development team was made to realize the epistemological gap between Human Factors and engineering practice (Bader & Nyce, 1998; Bowker, 1998; Dillon, 1998; Rosson, 1998; Simonsen & Kensing, 1998). The insight given drove home that Human Factors is a science, as opposed to engineering practice (Bella, 1987; Koen, 1985; Petersen & Lützhöft, 2009), and suggested the need for a change away from being pragmatic communitarians (Kerr, 2008) as archetype engineers are.

Becoming more familiar with the theoretical foundation of Human Factors also exposed that hereto, the development team had taken themselves as the users when developing the system (Bader & Nyce, 1998) for the last two generations of equipment, and that the development of more in-depth user requirements would require effort beyond what they anticipated: They had to span the gap from push-buttons all the way to a modern, display-based design. Effectively, they realized that human factors, after all, was not common sense (Bader & Nyce, 1998), as the author probably had made it look like the day before, asking questions to the interaction level of the current system – but skirting the more complicated questions relating to the functional

level. In brevity, they understood that they faced the situation Koen described when he considered engineers requiring knowledge not covered by the engineering knowledge base: Either depend on 'outsiders', or learn (Koen, 1985), of which either option was unwelcome.

Not surprisingly, given their situation, the development team responded in fashion, by anticipating and making the organizational dynamic conservatism (Schön, 1983) and the preservation of status quo (Argyris, Putnam, & Smith, 1985) explicit: 'This will not happen in real life'.

In that single sentence they expressed their (re-established) belief that they could do without Human Factors expertise, their certain expectation that Gemini would support their view, which he most likely would have done, had he been there, and at the same time demoted me from being a useful engineering colleague to become something of a dreamer with a hopeless case.

Winding up

Eventually, I managed to get back from the brink of the abyss, by reverting to the slide that summed up the status and agreements from the first day of the meeting. Reiterating that, and once again demystifying Human Factors by reminding them how useful even a short session like the day before in the workshop could be, I had the good fortune of reawakening the consensus we had reached in the morning.

In that way, I managed to offset the damage I involuntarily had done by diving into the more scientific parts of Human Factors, but the entire experience holds two distinct heuristics for Human Factors Engineers, in the Koenian (1985) sense:

> *Heuristic: When in engineering territory, do as the engineers.*
> *Heuristic: Do not lecture. Shut up, and 'engineer'.*

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DISCUSSION: RESULTS

Readers Note

The purpose of this chapter is to identify the results of the research, which are taken to be the common trends and issues identified in the three projects Alpha, Beta and Gamma.

It should be noted right away that uniting the findings from the three projects is not an attempt at generalization, which I find would be unsustainable, considering the high number of common circumstances and contexts between the three projects – my own participation (and contamination) prominent among such commonalities.

The direct purpose of synthesizing across the projects is the pursuit of answering the research question that was posed in the beginning of this thesis. A spin-off effect of such analysis is the identification of subjects that should be looked upon more closely in the future.

Answering the Research Question

Reverting to the final phrasing of the research question at this stage of work – 'Is the application of UCD according to ISO 9241-210 effective, efficient, satisfactory and easy to learn for those responsible for managing hardware and software design and redesign processes' – it is rather obvious that I cannot answer that at all, in that form: The data generated by the field work does not allow for the generality of the question, a subject that has been mentioned in the foregoing, and which is being discussed much further in the section named 'Validity and Reliability', starting on page 131. More work is clearly required to reach a level of knowledge that has the external validity required for the general form.

Acknowledging, hence, that I am constrained to claim only local knowledge, a substage of the research question could be phrased 'Was the application of UCD according to ISO 9241-210 effective, efficient, satisfactory and easy to learn for you'? Even this I cannot really answer, considering that the issue of efficiency suggests a rather long string of experiments, which in some or other fashion converge towards a predetermined measure of efficiency, like consumed time, resources or another quantifiable metric: The dissimilar threesome I have reported here certainly does not support this kind of analysis.

Filtering the issue of efficiency out of the equation, I however do believe that I can answer the remaining part of the research question, as it is now defined: 'Was the application of UCD according to ISO 9241-210 effective, satisfactory and easy to learn for you', but, alas, not even this reduced challenge can be answered with a clear affirmative, or indeed the contrary, but only with a 'Jein'.

'Jein'? In Germany, you might from time to time get this answer to one of you questions. It is not a real word, but composed of the German 'Ja', for 'Yes', and 'Nein', for 'No', and it is exactly the answer that is needed here; nothing is Black or White in this respect either. In hopeful elucidation, this chapter will look into each of the components of the research question – effectiveness, learnability and satisfaction – and qualify the 'Jein', trying to provide you with an impression on the proportion of 'Yes', and the proportion of 'No', as each of those three aspects are concerned.

Doability (Effectiveness)

Was it effective to do user centered design?

Building on the tales reported, I believe the reasonable answer is a 'yes'. It worked. The application of the process firstly described in ISO 13407 (1999), and subsequently in ISO 9241-210 (2009), appears to lead to usability, and my experience with effectiveness on the three projects would score a '3' on a scale from 0 to 5. Using the QUISS scale (Sherwood-Jones, 2008, p. 3), this scoring corresponds to "Functional: You can get a good outcome. It enables you to perform your tasks".

In each of the three projects, there are successful outcomes, hopefully evident from the descriptions of Projects Alpha and Beta, and just as evident in the unreported aftermath of Project Gamma: the cooperation with Gemini and the other persons mentioned is proceeding, and this project is in my expectation going to have a successful outcome along the lines of Project Alpha. There are good pointers in that direction, but observing the danger of self-delusion (Anderson, 2006; Hammersley, 1992; Herr & Anderson, 2005), I once again let the sources speak for themselves, in the form of a personal communication from 'Pisces[18]', received on March 5th, 2010:

18. See the narrative about Project Gamma, starting on page 91.

> "…The consensus here is that the HMI/Usability design…suits our purposes and is what we need to follow for the path forward. We like it very much and the ideas are sound…"

I suggest that the importance of the 'fate of the dogs', to remain with this particular metaphor[19] should not be underestimated, and it is my earnest hope that the success the three usability teams achieved can serve as inspiration and a positive example to potential applicators of UCD, in spite of its local validity, and in spite of the entirely qualitative argument and assessment.

Ease of Learning

Recalling that the quest of this chapter is to answer my initial research question, the next stage become the one of examining whether it was easy for 'those responsible for managing hardware and software design and redesign processes', in the incarnation of me, to learn user centered design?

Easy? No.

As the 'The Tale of Team Jelling and Buy-in', starting on page 51, and 'The Tale of the External Player', starting on page 74, demonstrates, it was actually not easy, as far as Project Alpha was concerned. I, myself, was fundamentally uncertain about the practical process to invoke, in spite of my previous knowledge and experience.

> 26-10-2007: One of the most important barriers in user centered design may be that the project manager (me) is not confident in the various steps to be taken…

As this tale shows, I believed that I had covered the issue by contracting the external Player to guide the methodological part, which eventually turned out to be an unfounded belief, but that is only part of the point: Staying with Project Alpha, but widening the perspective to consider the full team, there was a comparable uncertainty round the entire table, in spite of what I still consider to be world-class knowledge directly available in this particular multidisciplinary team. In spite of that, none of us had simply ever done user centered design before, in

19. See 'The Tale of Success' on page 82.

practice, in an industrial context, and we took a long, elaborate route to develop the methodology we eventually used: we ended in reality up by designing the plane while flying it.

Attempting to put words the problem, I suggest the pivotal point of the uncertainty, including that of the experts as well as my own, is the multitude of potential methods being described in literature; descriptions that however appear to be theoretical, and without references to 'war stories' that highlight the pros and cons of each method. For the uninitiated, or the one without practical experience, such methods appear interchangeable and without clear discriminations – which basically means that you have to try for yourself. Speculatively, the solution could be a more practice- and experience-based literature on human factors and user centered design.

User Satisfaction

Score	*Designation*	*Description*
0	Horrible	You refuse to use it unless it is absolutely necessary.
1	Unpleasant	Unpleasant to use, and is only used with considerable resentment. A pain in the neck.
2	Bland	Using it is just something you do when necessary. You are not involved or interested.
3	User Friendly	You are happy to use it and you use it out of choice.
4	Joy to Use	You get a kick out of using it. Using it provides real enjoyment.
5	A Miracle of Rare Delight	Possibly the most enjoyable [process] you are ever likely to find. A regular user of such [processes] will award this score very rarely.

Table 1 – Scoring of User Satisfaction, after (Sherwood-Jones, 2008, p. 3)

Last but not least, the most subjective issue of them all: user satisfaction. Was it satisfactory to do user centered design, to me, noting that in this particular context, the focus is on the execution of user centered design, and not on the outcome, successful or not?

There is no simple answer to that, and recalling the tales of the field in the foregoing part of this chapter, there were indeed ups and downs. However, the general trend with regard to satisfaction seems, reflectively, to be a slow build-up of moving in the right direction, marred by frequent setbacks and a few nasty crash landings.

When it comes to become concrete, the QUISS scale (Sherwood-Jones, 2008) appears once again to be a useful, household remedy for constipation like this, and supports the issue by putting words on unarticulated feelings. Referring to Table 1, none of the three projects reported on were 'Horrible', but neither, unfortunately, were 'Miracles of Rare Delight'. Nor, unfortunately, were they 'Joys to Use', either. In hindsight, and influenced by methodological uncertainty and the troubles and resistances recounted on Project Alpha, this hardly scores more than '1' on the QUISS (Sherwood-Jones, 2008) satisfaction scale. As proficiency increases, and the experience base builds up, so does satisfaction, and I believe Project Gamma deserves a '3' on the same scale: I did continue to do user centered design out of choice, and so will I do in the future. I even foresee it may become a 'Joy to Use', providing me with a kick.

Going Deeper

Answering the research question, as per the above, is useful, but also insufficient from the perspective of science, and Action Research: Writing about achieving success, or workability, which the answering of the research question can be considered to be, Feldman argues that one must also know the 'why', in the form of "an explanation or theory of why it works"(Feldman, 2007, p. 30).

Reflections on Effectiveness

So why did these three projects eventually succeed? I would be insincere if I suggested that I know: I do not, and I cannot offer any theory. I however suspect that some of the conditions that were common to each of the three projects play an important role, and suggest that they in union might serve as some sort of explanation:

Determination, in the individual Player, in the Team, in the Organization, in the Managers and in the Project Manager all appear to be links in the chain of success. I believe, in the nature of chains, that if

one of these links fail, not only will the individual usability project fail, but so will also the organizational process intended to lead to a sustainable organizational change, which is the important parameter in the perspective of the management of the company, which decided to venture into usability.

Buy-in: This perspective aside, to me the required determination can only spring from a true belief in the purpose and process of user centered design, and determination is thus a function of achieving *buy-in* by team members, management and any other relevant stakeholder in the process. The tales of all three projects pivot round the issue of achieving buy-in, of fostering ambassadors and usability champions, and of changing the culture in the organization to the level where usability becomes part of the fabric. Buy-in, I suggest, is the fundamental fuel that drives the usability engine, but while there is no set formula to achieve it, it would appear to be linked to learnability, which is discussed below.

Iteration: Especially Project Alpha, however, also demonstrated how buy-in, or perhaps stay-in, is tightly coupled to having *faith in the iterative process* of usability. Unless such trust is established and maintained, I suggest that you might have members of the multidisciplinary team that fear that big brother might stop you at a crucial, unfinished stage, and subsequently take you as a hostage for the unfinished, and therefore perhaps useless, solution. This fear, whether it is rational or irrational, appears to have a rather significant negative impact on the performance of the affected team member(s), and it may even be contagious. It may also be the root cause, or one of the fundamental causes, that lies at the foot of the difficulty experienced in getting commitment to the decision-making process in the multidisciplinary team. There is little doubt that a much more comprehensive knowledge of the dynamics of the multidisciplinary team is required to ease the undertaking of UCD. The necessary faith is however not only towards big brother, the organization, but also towards the Project Manager and the other Players in the team: You need, I suggest, to feel respected and secure to such an extent that you will be listened to in the team, and taken seriously. In my understanding, fostering and maintaining this basic feeling of mutual respect, safety and freedom from bullying resides with the Project Manager, and with every relevant communication coming from the higher levels of the Organization.

Receiving positive and reassuring signals from the higher echelons of the organization is, in my view, imperative for maintaining

the trust and confidence, and I wholeheartedly agree with Zuber-Skerrit, who notes that

> "in my experience, it is futile to try to achieve a significant improvement or change in an organization unless it is fully backed by the chief executive officer and senior management" (2001, p. 8).

Gulliksen, Boivie and Göransson (2006) concur, and state that "…support from…upper management is crucial" (2006, p. 584).

Consensus appears to me to be a critical factor, at any level. I realize that I am promoting my personal values, but I cannot imagine that a process steamrolled through will achieve critical mass, and sustainability. It might take teeth-grinding patience, from time to time, to undertake user centered design, and indeed to propagate the associated culture and the thinking to the rest of the organization, outside the multidisciplinary team, but that is a price that has to be paid: The loss of consensus might speculatively lead initially to the loss of faith in the process, which might lead to the loss of determination, which eventually might lead to the failure of the entire undertaking.

Team Jelling: A loss of consensus might also lead to the disintegration of the team: I often believe that if the resistances and skulduggery reported for Project Alpha had not been contained in an amicable fashion, eventually, the continued existence of the *jelled team* would have been at stake, and the hard-won victory of creating a functional team would rapidly have been lost. All in all, transforming the group of individual experts into a real team, resulting in the so important mutual and genuine professional and personal respect between the members, may be the first and last condition for success of them all. Without a jelled team, I suggest, UCD will never fly.

Reflections on Learnability

One thing is the methodological struggle of the usability-informed part of the multidisciplinary team I have reported for Project Alpha. Another, however, is a consideration of how baffling and fuzzy the method must have appeared to those team members who were uninitiated with regard to usability and human factors when we set out. While the data reported in this thesis does not contain any concrete input relevant to this question, it is nevertheless hard not to speculate about it – especially noting that these team-members were of the

solution-oriented observation, and as such perhaps had less interest in the methodological development, and more interest in the practical application and the corresponding practical results. This is an issue that could explain the impatience we felt from time to time from that part of the team.

Widening the focus with respect to learnability even further, it is clear to me that I learned a lot from Project Alpha, also at the nuts-and-bolts level of designing for usability. This learning stood me in good stead in Project Gamma: I found myself using the most effective methods learnt in Project Alpha, and avoiding the blind alleys I also knew from the same undertaking. Project Beta, in turn, I managed partly through the support of 'the Supporter', and partly through my previous human factors training - albeit training that I have received as part of my post graduate studies, and not as a part of my engineering education. This line of thinking brings with it speculation on the volume of usability skills and user centered design knowledge a usability project manager has to have, in order to provide effective leadership. On the background of the projects reported on in this thesis, I would say 'quite a lot': the project manager appears to need rather substantial insight to lead a balanced discussion and to steer the team towards consensus, a process that inevitably is ridden with compromise – engineering-wise and human factors-wise. Without understanding both sides – the practical and the theoretical – is this indeed feasible? In continuation, but not of lesser importance, it is experientially rather likely that the project manager might find himself in situations where he has to argue the ways and means of usability, beyond the confines of the team. Again, to do this in earnest, convincingly, he needs to have a corresponding knowledge of the subject.

Taking the concept of learnability a final step in reflection, I find it rather likely that the multidisciplinary design team will be dysfunctional unless all members acquire a basic understanding of usability. Deductively, this means that the concept of learnability is not restricted to apply to 'those responsible' for the development (the project manager and the usability experts that are team members), but is applicable to all team members: usability must be easy to learn for all stakeholders, in fact.

Transferring a reasonable amount of usability knowledge to the complete group of stakeholders, which in many organizations experientially is predominantly staffed by people with an engineering practice or solution-oriented background, is however an issue which appears to be rather difficult to achieve: people with their roots in

solution-oriented practice appear to be disinterested in the theory of human factors, usability or user centered design, at least when this is given in any form that resembles lecturing. My understanding of this issue is borne out by the experiences of in particular projects Beta and Gamma, and by Project Alpha when it came to convey usability as a subject beyond the multidisciplinary team: More than a few minutes of talk, or a few lines of text, preferably at the level of practice, is what one appears to get, before interest vanes or the session becomes directly counter-productive. It would appear that avoiding a head-to-head confrontation with usability theory is something to be striven for.

Importance (5 highest)	*Reason for poor usability*
4	Legacy from old systems
5	Lack of usability knowledge
4	Lack of awareness
3	Lack of engineering usability (in tools and platforms)
4	Time pressure/economic reasons
5	Maintenance of context-of-use knowledge
5	Lack of client demand
3	Lack of end-user demand
5	Lack of common design vision
4	Unstructured [collection and use of] end-user feedback
4	Function-creep
3	Convenience, laziness
5	Lack of evaluation [of usability]
5	Who keeps track of what to put where [style-guide; common design rules]
4	[Lack of] usability advocate
4	Design by engineers
3	Regulations, standards
4	Unclear added value

Table 2 – The brainstorming-results about causes for 'lack of usability' by the Project Alpha multidisciplinary team, following the evaluation of existing products.

'Playing' usability appears to be an entirely different story, however, and the expert evaluations conducted both on Project Alpha and Project Gamma appears to support this notion: Evaluating existing products, in an amicable, forward-looking fashion, had noteworthy success in both cases.

As Table 2 demonstrates, a few hours of brainstorming about the 'why' a product exhibits poor usability provides clear understanding,

insight and learning for those involved, including those that not theoretically well founded or similarly interested. In the actual projects, such sessions were happy, or even fun, and in my judgement achieved buy-in much faster than any lengthy lecture would ever have.

METHODOLOGY, VALIDITY AND RELIABILITY

Methodology

Readers Note

What did I really do?

The chapter on 'Tales and Reflections' portraits my actions and the practical method used in the triplet of UCD projects, and hence implicitly my methodology, but not explicitly what I really did, from a scientific perspective and in a scientific frame: Was it science at all, or just merely solving a number of problems?

The purpose of this chapter is to provide an answer to this issue, by anchoring the undertaking of the three projects to the firm bottom of theory and scientific methodology.

Stylistically, this section is non-experimental, written in what I perceive to be the tradition of the disinterested scientist, however in first person, since it seems artificial to put a third-person distance to something as close to home as this.

Reverse Engineering

The foregoing section on 'Research Process' (see page 39) outlines that the research reported here really was initialized without much of a preconceived plan or careful deliberation – I simply grabbed the opportunity when it presented itself, and started to 'research', with what must be called a very basic understanding of science (recalling my engineering background). I was happy about that for some time, doing the work on Project Alpha, and keeping my Research Diary (RD), in which the first entry is dated September 24th, 2007.

Nevertheless, the 'methods-ghost' was haunting me – not least because fellow PhD students were talking so confidently about their methods and their method-chapters. On March 26th, 2008, I made a note in my RD:

"Cassiopeia[20] was talking about what we were doing [in Project Alpha], and how it fitted into my methods chapter…and suddenly Mensa said something about 'Action Research'. Click. This was one of the missing code-words in what I've been doing until now: Which method I'm really using? Suddenly, blinding clarity. Thanks! Bought a book, understood the concept, and changed the title of this diary as a result"

Nothing is that easy, though. 'A book' was Herr and Anderson's 'The Action Research Dissertation' (2005), and while it opened the world of action research to me, it also managed to make me doubt my own approach profoundly: I simply did not feel I fitted into all of the framework presented, the constraints suggested to apply, and the multitude of subcultures of action research: Reflective Practice, Action Science, Autoethnography and Participatory Research, to mention a few. This is in itself not problematic, considering that action research is value laden (Herr & Anderson, 2005), and having to take a stance, rather than simply apply a cookbook recipe, is foreseen within the traditions of AR: "students may find one approach to action research more congruent with their own set of beliefs, values and goals" (Herr & Anderson, 2005, p. 9).

So, while it was quite clear that fundamentally, I was doing something along the lines of 'action-something', the question was just 'What?', or 'Which flavour?'

Eventually, the only cure is to work it out, to come face to face with the monster, and find one's peace. The following part of this chapter is the conclusion of that particular reverse-engineering process.

The Nature of Action Research

In terms of definition,

"Action Research is a systematic approach to investigation that enables people to find effective solutions to problems they

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20. As mentioned previously, in some parts of this thesis persons are named after the larger constellations close to Earth, for the sake of anonymity.

> confront in their everyday lives…action research focuses on specific situations and localized solutions" (Stringer, 2007, p. 1).

Fundamentally, Action Research aims at knowledge production through the solution of real-life problems (Bargal, Gold, & Lewin, 1992; Greenwood & Levin, 1998; Lewin, 1946; Stringer, 2007).

Characteristically, Action Research is messy (Goodnough, 2008; Peter Reason & Bradbury, 2006; Schön, 1983), being focused on the complex world of experience, and hence not accepting the friction-free, perfect information and 'other things being equal assumptions' compromises of academic social research (Greenwood & Levin, 1998)

Methodologically, Action Research builds on reflection (Lewin, 1946; McNiff & Whitehead, 2006; Schön, 1983; Zuber-Skerritt, 2001), however with the important, but curiously overseen issue of surprise as the main driver (Schön, 1983).

Practically, Action Research consists of a number of stages which the researcher(s) iterates through. Lewin (1946), originally, describes AR as consisting of three fundamental stages, comprising Planning, Execution and Reconnaissance (or Planning, Action and Evaluation (Bargal, et al., 1992)), but the latter stage of reconnaissance has four built-in sub-stages (evaluation, provision of new general insight and learning, provision of a foundation for forward planning, and provision of a basis for modifying the overall plan). Other definitions of the AR method are even simpler, describing AR to consist of four or five main steps to undertake: ' Observe – Reflect – Plan – Act' (Coghlan & Brannick, 2005; Zuber-Skerritt, 2001) or 'Observe – Reflect – Act – Evaluate – Modify' (McNiff & Whitehead, 2006).

The positionality of the researcher, and the researcher's realization of her position, is of pivotal importance in action research: Not only are there various traditions established and emergent, depending on researcher positionality, but the positionality influences the validity criteria that applies to the particular subform. Herr and Anderson (2005) outline the continuum of positionality from the Insider, who studies her own practice, to the Outsider studying Insiders, which is similar to an ethnographic approach. Not surprisingly, the validity criteria applying in the latter case are corresponding to those suggested by Lincoln and Guba (1985), according to Herr and Anderson (2005).

Mismatches

Finding oneself within the matrix of positionality and research tradition is an obvious domestic challenge, which is furthermore complicated by the many derivatives of Action Research (AR) being described by a rich literature: Participatory Research, Critical Action Research (Carr & Kemmis, 1986), Action Learning (Revans, 1980, 1981), Reflective Practice (Schön, 1983), Autoethnography (Bochner & Ellis, 2002) and Action Science (Argyris, et al., 1985), to mention the more prominent.

The main challenge is however that both derivates and mainstream Action Research itself, if there indeed is such a thing, are focused towards particular niches, and each have what appear to be politically oriented agendas, mostly towards social justice and the empowering of minority groups. Deferring from starting a commentary of this, I found that such agendas essentially barred my adoption of the corresponding methods or research practices, considering that what I did was of a more pragmatic, business-oriented nature. The latter consideration actually drove me towards a brief flirt with Action Learning (AL), which is focused on business. My considerations included the construction of the argument that what I did constituted AL, as it is defined by Revans (1981, p. 9):

> "Action learning is a means of development, intellectual, emotional or physical, that requires its subject, through responsible involvement in some real, complex and stressful problem, to achieve intended change sufficient to improve his observable behavior henceforth in the problem field",

a finding that was fundamentally supported by Zuber-Skerrit's definition of AL, which, according to her, "means learning from action or concrete experience, as well as taking action as a result of this learning" (2001, p. 1). This particular line of thinking however sank to a final grave on the bottom of the sea of method: AL is undertaken as interplay between management in practice and analysis of the practice by a 'set' of peers: Others who are in a similar situation of (self)development. Revans defines the process by noting that

> "'Learning-by-doing' is an insufficient description…it is rather 'Learning to learn-by doing with and from others who are also learning to learn-by-doing'" (Revans, 1980, p. 288).

In my situation, being the sole practitioner, and hence without a 'set', or the option to form one, it was clear that the AL-argument was unsustainable.

Like Action Learning, Action Science (AS) (Argyris, et al., 1985) appears to be politically neutral, and for some time, I entertained the notion that what I did was AS:

> "The action scientist is an interventionist who seeks both to promote learning in the client system and to contribute to general knowledge" (Argyris, et al., 1985, p. 36).

Action Science is primarily an attempt towards changing mainstream action research back to a more scientific foundation (Herr & Anderson, 2005), aiming as it does to generate "knowledge that is a useful, valid, descriptive of the world, and informative of how we might change it" (Argyris, et al., 1985, p. x). Action Science is "one of the best efforts to deal with the relation between AR and scientific method", according to Greenwood and Levin (1998, p. 188).

Like my considerations about AL, further study however made it clear that my research did not fit the AS paradigm either: The primary concern of action science is organizational development and organizational learning (Herr & Anderson, 2005), and, more importantly, it utilizes the 'outsider-in-collaboration-with-insider' positionality to achieve these ends. In action science, the researcher appears to be distinct from the participants and his (or her) role as the interventionist precludes, in my mind, pursuit of this approach in the present case: Answering the present research question requires 'uncontaminated' studies of the application of UCD, with in turn means that my own role must be consistent with managing and delivering such projects - notwithstanding that organizational learning inevitably is a desirable by-product of the process. Being the overt interventionist would have jeopardized the entire undertaking.

One could, considering the above, argue that AL and AS could have been adapted to suit my particular purposes, and certainly with some right, considering that such adaption is not uncommon. The subsequent sections bear evidence to this, demonstrating as they do a synthesis between methodologies. However, Bullough and Pinnegar (2001, p. 15) state a principle, which I find myself subscribing to: "Scholarly integrity requires that where methods are borrowed, established research practices be respected", and continues that "…the standards of scholarship of the embraced tradition still must be met".

In the present case, this does exclude AL and AS, in the sense that I judged the distance between those two methods, and the one employed, to be too significant to be able to honor the traditions associated with Action Science and Action Learning.

Realizing my lack of 'belonging' methodologically, I eventually did what I should have done from the beginning: I reverted to the original sources of Lewin (1946) and Schön (1983). In doing so, two things were accomplished: Insight into the basic paradigms, and how they are at odds with mainstream science, and the ability to identify with reflective practice. Both subjects are treated in detail below. A spin-off was furthermore an insight into how science develops: the values now attributed to action research, and the subforms, are the result of discourse and argument, rather than being rooted in the original thinking.

The Argument with Mainstream Science

As the study of the action-oriented sciences and practices deepens, it is clear that the identification of the particular subculture within this sphere, congruent with one's research practice, values and beliefs, is only one part of being an Action Researcher.

A more fundamental issue exists externally: Action research (AR) is by many considered as non-scientific (Action research is in this context considered to include the 'family' of Action Learning, Action Science, Reflective Practice and the associated subcultures of each distinct methodology). Zuber-Skerrit and Fletcher recognize this issue, and states that not only do action researchers need to meet traditional research requirements, they also

> "need to demonstrate the requirements of AR, such as explaining and justifying the action research paradigm…, appropriate methodologies, their choice and use of qualitative research methods, different standards of ethics and values, and evidence of learning, reflection and a contribution to knowledge in both theory and practice"(2007, p. 414).

McNiff, Lomax and Whitehead acknowledge the additional challenge connected to the application of action research within academia, and note that

> "there is still skepticism from some people working in established traditions about whether action research should be recognized as 'real' research"(2003, p. 143).

while some even go as far as suggesting that

> "AR is almost universally viewed with Olympian disrespect by conventional social scientists, who see it as unsystematic, atheoretical storytelling" (Greenwood & Levin, 1998, p. 75).

The reason for this uneasiness can well be grounded in the epistemological basis of action research, building in the main, as it does, on the thoughts and arguments of Lewin (1946) and Schön (1983): Action research is by nature post-positivist, belongs to the realm of social sciences (Zuber-Skerritt, 2001), and is, as Stringer notes, "Fundamentally… grounded in a qualitative research paradigm" (2007, p. 19).

Philosophical and Epistemological Musings

Deepening the illustration of the academic position of 'action-something', Ziman (1998) could be a reasonable place to start, considering his contribution to the discussion of science in various modes. Following half a century in science, Ziman examines the continuum of knowledge production, and the way it is developing. Originally, in Ziman's view, there were two distinct cultures, the one being the 'interested', industrial science, and the other being the 'disinterested', free, academic science conducted in universities (Mode 1). Gibbons (1997) expands on this theme, noting that research only recently has become a core value in universities, but also that many in academia hold the position that "the production of knowledge is guided by a set of research practices which determine, among other things, what shall count as new knowledge (1997, p. 1)".

In combination, the suggestions of Ziman and Gibbons serve to argue not only the role of the universities as being in command of the research agenda, but also that they have the final role in determining the validity of potential research methods and results. It is not surprising, in this light, to see the universities preserve the model of scientific explanation described by Popper, and hence in line with the writings of Hume and Mill (Cook & Campbell, 1979) :

> "To give a *causal explanation* of an event means to deduce a statement which describes it, using as premises of the deduction one or more *universal laws*, together with certain singular statements, the *initial conditions*" (Popper, 1959, p. 38).

The adherence to the ways of natural science appears to be strong in traditional academia. "For many, the rules that govern mode 1 are identical with what is meant by good scientific practice", Gibbons (1997, p. 3) notes while preparing to contest that issue as far as Mode 2 is concerned. Gibbons continues that he finds that for many,

> "Mode 1 is meant to summarize in a single phrase the cognitive and social norms which must be followed in the production, legitimation and diffusion of knowledge" (1997, p. 3)

which is backed up by Carr and Kemmis (1986), who go as far as suggesting that "adherence to the philosophical preconceptions entrenched in its own 'view of the world" is a "precondition of membership to the scientific community" (1986, p. 75). Greenwood and Levin observes that "in academic circles, AR, applied research, and qualitative research are general denigrated as unscientific" (1998, p. 54), and by remarking that that for many traditional scientists, "Researchers who adhere to these rules are by definition 'scientific' while those who violate them are not" (1997, p. 3), Gibbons completes the picture of an academic elite that (pretends to) hold the reins of knowledge production. It is not difficult to associate such views with what Argyris et. al. calls the "mainstream account of science", of which the

> "core features are 'hard' data, explicit inferences connecting data and theory, empirically disconfirmable propositions subject to public testing, and theory that organizes such propositions" (1985, p. 12)

– or, in other words, logical positivism.

The discussion of Ziman and Gibbons relate to their observation that traditional, positivist academic science increasingly is being challenged by a hybrid culture (Gibbons, 1997; Ziman, 1998), sliding towards what Ziman labels 'post-academic science'. This mode, or Mode 2, as it is also labeled, is project-oriented, transdisciplinary and 'interested' (Pain, 2008) – involving, as it does, teams of academia, industrial researchers, companies, governments and society at large (Gibbons, 1997; Ziman, 1998). For the reasons stated above, post-

academic science is however not of high standing with the traditionalists. As Gibbons notes, accentuating the distrust associated with Mode 2,

> "… in mode 1 it is conventional to speak of science and scientists [whereas] it has been necessary to use the more general terms knowledge and practitioners (or researchers) when describing mode 2" (1997, p. 3).

While not being explicit, this distrust could well have roots in the issue that post-academic research is being conducted in the field, away from the highly controlled environment of laboratories – which in turn means that mode 2 in general is depending on speculation about causal relationships:

> "For positivists, the most important feature of scientific theories is that they are open to, and are actually subjected to, test: that they can be confirmed, or at least falsified, with certainty. This requires the exercise of control over variables, which can be achieved through physical control, as in experiments, or through statistical control, as in survey research. Without any control over variables, it is argued, one can do no more than speculate over causal relationships, since no basis for testing hypotheses is available" (Hammersley & Atkinson, 2007, p. 6)

This, consequently, makes post-adademic research inherently non-positivist, considering that causes in field work and social sciences often – usually – are unobservable (Cook & Campbell, 1979).

Knowledge and Practice; Knowledge in Practice

There is no doubt about the gravity and importance of the mode discussion, and the influence a change towards post-academic research may have on basic research, free publication and other issues of vital importance to science, but ironically, or perhaps even sadly, this discussion to a great extent misses a third, potential source of knowledge generation: The tacit and explicit knowledge held and generated by professionals in practice. Considering that practice, and with it, the concept of knowledge generation in practice, is even further removed from mainstream academia than is mode 2 research, it is not a

surprise that acceptance from the academic establishment is not easily forthcoming, but it is interesting to note that the distance between post-academic research and the action-oriented types of inquiry appears to be short: Like Mode 2 (Gibbons, 1997; Pain, 2008), the action-oriented research types are also reflexive, and often includes an interdisciplinary or multidisciplinary set of practitioners, who are collaborating on a specific and locally contextualized problem (Greenwood & Levin, 1998; Stringer, 2007).

Probably as a result of the limited epistemological distance between these two scientific stepchildren, the pivotal argument relating to their raison-d'etre also appears to be shared: Their 'right' to knowledge generation and their capability to validate knowledge. Considering self-study, which is akin to action research (Feldman, 2003), Bullough and Pinnegar notes that it "represents [the] trend away from modernism and its assumptions about legitimate knowledge and knowledge production toward broadening what counts as research" (2001, p. 13). The mere existence of this argument, however, highlights the difficulty the action-oriented research paradigms face when it comes to becoming accepted as valuable and valid research methods – in spite of the many voices arguing the fundamental question of knowledge resulting from practice, both in terms of its existence and its importance. Lewin (1946) is the first, and perhaps the most prominent of those. Challenging the mainstream academic view while focusing on the social sciences, he aptly notes that

> "The research needed for social practice…is a type of action-research, a comparative research on the conditions and effects of various forms of social action, and research leading to social action. Research that produces nothing but books will not suffice" (1946, p. 144).

In this way, he is pointing out that necessarily, social research has to be practical, and undertaken outside the walls of the universities. Explicitly, Lewin is acknowledging that knowledge does exist in practice and is generated through action.

Schön shares Lewin's view. Building up to a definition of an 'epistemology of practice', he also challenges mainstream academia by describing professional schools as places that reserves "the highest status for the scientists whose theories the more practice-oriented faculty members are supposed to apply" (1983, p. 308), and by suggesting that research and practice disturbingly follow different paths,

tend to live in different worlds, and have little to say to each other. Schön labels this dilemma 'rigor or relevance', and notes that some

> "professionals opt for the high ground. Hungry for technical rigor, devoted to an image of solid professional competence, or fearful of entering a world in which they feel they do not know what they are doing, they choose to confine themselves to a narrowly technical practice" (1983, p. 43).

In contrast, he describes another set of professionals, those who work in the swamp, which he suggests holds the problems of the greatest human concern:

> "There are those who choose the swampy lowlands. They deliberately involve themselves in messy but crucial important problems and, when asked to describe their methods of inquiry, they speak of experience, trial and error, intuition and muddling through" (Schön, 1983, p. 43).

Reflection, Schön argues, is the key to knowledge generation:

> "Through reflection, he [the practitioner] can surface and criticize the tacit understandings that have grown up around the repetitive experiences of a specialized practice, and can make new sense of the situations of uncertainty or uniqueness which he may allow himself to experience" (1983, p. 61).

Schön continues to stress the importance of action and of retaining the capability to become surprised as the drivers for new knowledge:

> "…the practitioner allows himself to experience surprise, puzzlement, or confusion in a situation which he finds uncertain or unique. He reflects on the phenomena before him, and on the prior understandings which have been implicit in his behavior. He carries out an experiment which serves to generate both a new understanding on the phenomena and a change in the situation. When someone reflects-in-action, he becomes a researcher in the practice context" (Schön, 1983, p. 68).

Schön's observation is deeply significant in two different fashions. Firstly, it establishes 'Reflective Practice' as a member of the

Action Research (AR) community (or indeed vice-versa!), by describing a process which is consistent with the mainstream description of AR (Lewin, 1946; McNiff & Whitehead, 2006; Zuber-Skerritt, 2001).

Secondly, it establishes the acting practitioner as a researcher, generating new knowledge through reflection, driven by surprise. "Clearly", Schön later suggests, driving the point home,

> "…recognizing that practitioners may *become* reflective researchers in situations of uncertainty, instability, uniqueness and conflict, we have recast the relationship between research and practice. For on this perspective, research is an activity of practitioners" (original emphasis) (1983, p. 308).

Schön is not alone with this view. "There can be no learning without action and no (sober and deliberate) action without learning" Reginald Revans is reported to have stated (Coghlan & Brannick, 2005, p. 15)[21], and considering the 'Human Realm', Polkinghorne concludes that

> "knowledge claims about human actions need to be about what people have done in specific situations or reports people have given about their thoughts or about meanings they attributed to themselves, to others' actions, and to social and physical situations" (Polkinghorne, 2003b, p. 8).

In this fashion, Polkinghorne is confirming the understanding that social knowledge springs from action undertaken in real-world practice. Also Greenwood and Levin are of this orientation, speaking for action research:

> "This is the crux of the credibility-validity issue in AR. The conventional social research community believes that credibility is created through generalizing and universalizing propositions of the universal hypothetical, universal disjunctive, and generic types, whereas AR believes that only knowledge generated and tested in practice is credible" (Greenwood & Levin, 1998, p. 81)

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21. The original source – R. W. Revans: The ABC of Action Learning, 1998, p.83 – appears to be currently unavailable.

Without it being stated in so many words, Schön (1983), Polkinghorne (2003b) and Greenwood and Levin all advocate the validity of the insider positionality: a practitioner is by nature an insider, and assigning the power of knowledge-building to reflective practice, or action undertaken in real-world practice, is to endorse a scientific positionality that is otherwise met with caution, or doubt. Hammersley exhibits this kind of caution, but nevertheless finds "some plausibility" (1992, p. 144) relevant to the potential advantage insiders may have, by suggesting that there are "more specific and defensible methodological arguments on which the claim that practitioners are best able to understand their activities and situations could be based" (1992, p. 143):

> "a) that practitioners have access to their own intentions and motives in a way that an observer does not, and so have a deeper understanding of their own behavior than an outsider could ever have;
> b) that the practitioner will usually have long-term experience of the setting being studied, and will therefore know its history at first hand, as well as other information that may be required to understand what is going on. It would take an outsider a long time to acquire such knowledge, indeed this may never be possible;
> c) that the practitioner already has relationships with others in the setting and can use these in order to collect further data. Once again, an outsider would need to spend a considerable time in the field building up such relationships;
> d) that because practitioners are key actors in the setting, they are in a position to test theoretical ideas in a way that a mere observer can never do" (Hammersley, 1992, p. 144).

Hammersley (1992) furthermore does note that for each of these arguable points, there are corresponding counterpoints, and concludes that in his view, insiders do not have access to information that is inaccessible to researchers with another positionality. The interesting issue about this argument is the implicit endorsement of the insider positionality: While it is not superior to outsider positionality, it is not inferior either.

Reverting to the counterpoints Hammersley discusses, their presence does not weaken the arguments; such counterpoints can be used as validity checks: If the potential pitfalls are avoided, mitigated or handled in a responsible manner, they lend validity to the overall argument. The section on validity below will revert to Hammersley's arguments.

Methodological Development

Practicing Reflective Practice

It can be argued that reflective practice is insufficiently specific to be more than an approach, or perhaps even nothing more than a frame of mind. Indeed, the mindset and skills required to be (or become) a reflective practitioner are unclear (Lyons, 1999).

The depth and structure of reflection is obviously of great importance when regarding reflective practice through academic glasses: It will not be appropriate, and hardly meet with academic acceptance, to assume that professional practice will be improved by someone taking a sunny walk in a reflective mood (Moon, 2004). Rather, something more tangible, directed and structured is required, including a description of the experience in context and the outcome of the reflection, in terms of evidence of learning or change (Moon, 2004)[22].

Acknowledging this argument, and with due consideration of the subsequent discussion of research validity, it is thus desirable – perhaps necessary – to augment the concept of reflective practice, when it comes to applying it. In the current context, this desire to add structure and rigor to reflective practice leads to autoethnography. While considering a change from reflective practice to autoethnography may appear to be a twist of focus, or a 'change of horses in midstream', this is however not so: considering my research setting and in particular my research positionality, there is a blurred limit (Geertz, 1983) between the two types of science. Zuber-Skerrit and Fletcher (2007, p. 423) finds that "AR [action research] is…situation specific, methodologically eclectic, and thus not prescriptive in its use of methods, processes or final goals", which legitimizes the involvement of autoethnography, or indeed any other useful and applicable method. "Methods blend", Bullough and Pinnegar concur, and add thoughtfully that "with blending comes difficulty in establishing authority grounded

22. It should be noted that Moon (2004) is primarily concerned with 'Reflective Learning', but since reflective practice is "in essence, a professionalized form of 'reflective learning'" (original quotation marks) (Moon, 2004, p. 80), the observations are valid also for reflective practice.

in methodological traditions". This point will be reverted to in the chapter about 'Validity and Reliability', see page 131.

Fundamentally, autoethnography is the creation of ethnographical data based on the observation of the self, however in context: autoethnography includes the interaction between the self and the environment (s)he is in. At this basic level, it is not difficult to see an association with reflective practice, which pivots round the observation of phenomena, and through experiments, the generation of new understanding of the phenomena and a change in the situation (Schön, 1983). Some would argue that the latter – the change in the situation – is the main differentiator between the action sciences and ethnography, and in many, or most, 'realist ethnography' contexts they would be right.

In the autoethnographical contexts, it is suggested that this is not necessarily so: It depends on the role of the autoethnographer. If that role is similar to that of the practitioner, in the sense that the autoethnographer participates in some sort of undertaking which strives towards development or change, or application of new knowledge, or, in fact, anything but the preservation of status quo, the autoethnographer causes change, or participates in causing change, and is hence not just the proverbial fly on the wall: He interacts with the research setting, and causes, in part or in full, the change he is observing. In other words, the autoethnographer becomes an action researcher in the tradition of the reflexive practice.

Lützhöft et. al. suggest that this is in reality the nature of ethnography as such, in the sense that it both serves to identify factors that account for change and cause change in the studied situation (Lützhöft, et al., 2010), while Anderson adds additional support by noting that "Autoethnographers should expect to be involved in the construction of the meaning and values in the social worlds they investigate" (2006, p. 384), and continues to note that some autoethnographers "seek to persuade others to change" (2006, p. 384) and "… can also be used persuasively to encourage others to commit to certain lines of action" (2006, p. 385), adding weight to the suggestion that the borderline between autoethnography and reflexive practice is blurred, if at all present, in cases like the one being considered.

Analytical Autoethnography

Presently, autoethnography is in many cases synonymous with postmodern scientists like Carolyn Ellis, Arthur Bochner, Laurel Richardson and Norman Denzin, who have been promoting what Ellis labels 'evocative autoethnography' (Anderson, 2006) - autoethnography that generates vivid images and feelings in the reader. It is beyond this thesis to discuss evocative autoethnography in width or in depth, but one particular feature needs further scrutiny: in evocative autoethnography, there is by intent no generalization: "the narrative text refuses the impulse to abstract and explain" (Ellis & Bochner, 2003, p. 217)

The stance taken by Ellis, Bochner, Richardson and Denzin has caused discussion, which in turn have resulted in the suggestion of more traditional alternatives by other scholars. Among them, Anderson suggests a form of autoethnography which he labels 'analytical autoethnography' (2006). Epistemologically, Anderson suggests that analytical autoethnography – as opposed to evocative autoethnography – "fits well with traditional symbolic interactionist ethnography" (2006, p. 391). Primarily using reflection to develop analytical insights (Hammersley & Atkinson, 2007), Anderson (2006) furthermore suggests analytic autoethnography as being more stringent than the evocative autoethnography, and as being characterized by five distinct features:

- Complete Member Researcher
- Analytical Reflexivity
- Visible and Active Researcher in the Text
- Dialogue With Informants Beyond the Self
- Commitment to an Analytical Agenda

Complete Member Researcher

Quoting Robert Merton, Anderson (2006, p. 379) suggests that the analytic autoethnographer is the ultimate participant in a dual participant-observer role, or, in other words, is the complete member researcher: she (or he) belongs entirely to the world being studied, and is at the same time performing the study. Adler and Adler (1987, p. 87) suggest that the complete member researcher "come closest of all researchers to approximating the emotional stance of the people they study", which resembles the potential benefits of having an insider

positionality, described by Hammersley as arguably being capable of providing "access to their own intentions and motives in a way that an observer does not, and so have a deeper understanding of their own behavior than an outsider could ever have" (1992, p. 144).

As such, the point is the one of authenticity, or reduction of error in the sense-making and translation of meaning: By being a complete member researcher, some of the uncertainty is, potentially avoidable.

Analytic Reflexivity

In the basic form, analytic reflexivity describes the interaction – coupling – between the researcher and the research situation, and hence the reciprocal influence between the two – or, in a word, dialogue with the self and with others. At a deeper level,

> "reflexivity entrails self-conscious introspection guided by a desire to better understand both self and others through examining one's actions and perceptions in reference to and dialogue with those of others" (Anderson, 2006, p. 382).

Within autoethnography, the internal focus sharpens, perhaps at the expense of dialogue. While Anderson observes that "autoethnographers should illustrate analytic insights through recounting their own experiences and thoughts as well as those of others" (2006, p. 384), Atkinson, Coffey and Delamont (2003, p. 62) exclude the dialogue entirely, by stating that

> "Ethnographers-as-authors frame their accounts with personal reflexive views of the self. Their ethnographic data are situated within their personal experience and sense making. They themselves form part of the representational process in which they are engaging and are part of the story they are telling."

It is interesting to note commonality between the autoethnographer and the reflective practitioner. The hallmark of the former, the autoethnographer with complete member researcher positionality, is that he or she has 'intimate familiarity through occupational participation'. This, however, is an accurate description of the practicing professional. Combining this with the observation that the means to deepen the understanding of the world being studied –

reflection - is also shared, the blurry nature of the boundary between these two sciences, as observed on above, is further highlighted.

Visible and Active Researcher in the Text

Continuing the issue of reciprocal interaction between the researcher and the world being studied, Anderson suggests that this involvement should be obviously visible in the construction of value and meaning:

> "[Autoethnographers] should openly discuss changes in their beliefs and relationships over the course of fieldwork, thus vividly revealing themselves as people grappling with issues relevant to membership and participation…" (2006, p. 384)

Such transparency, Anderson argues, mitigates on what he sees as a common criticism of conventional ethnography, where the researcher is often largely invisible (Anderson, 2006). The researcher visibility is however also an important issue in the sense-making process, or rather, in the transferability of the ethnographic data: Unless the role of the autoethnographer is transparent, it is impossible to judge to what extent the phenomena observed and reported are concrete, or interpretations made by the ethnographer. Anderson notes that

> "The researcher's own feelings and experiences are incorporated into the story and considered as vital data for understanding the social world being observed" (2006, p. 384).

Dialogue with Informants beyond the Self

Self-indulgence - which the Oxford Dictionary of English defines as "doing or tending to do exactly what one wants, especially when this involves pleasure or idleness" - is an imminent risk in anything as self-centered as autoethnography. In a thesis like the present, there are admittedly many "I's", and clearly enough to speculate about this. It is a concern shared by many. Sparkes (2002) devotes an entire chapter to this subject, under the heading of "Autoethnography: Self-indulgence or Something More?" (2002, p.

209), while Anderson (2006, p. 385) warns that "Autoethnography loses its sociological promise when it devolves into self-absorption". Hammersley and Atkinson concur by believing that there is "little justification for substituting self-absorption for a thoroughgoing sociological or anthropological imagination" (2007, p. 205). Anderson labels the potential problem self-absorption, and notes that "given that the researcher is confronted with self-related issues at every turn, the potential for self-absorption can loom large" (2006, p. 385).

The mitigation, Anderson claims, is through dialogue with others, and, at the same time, this dialogue is what differentiates analytical autoethnography from its evocative sibling:

> "Unlike evocative autoethnography, which seeks narrative fidelity only to the researcher's subjective experience, analytic autoethnography is grounded in self-experience, but reaches beyond it as well" (2006, p. 386).

The essential issue here is in the 'reach beyond the self', something which Anderson labels the ethnographic imperative: The dialogue with 'data' or 'others' (Anderson, 2006), which is achieved through the gathering of other voices, whether verbally or through literature; a framing of the understanding of the autoethnographer against the understandings and interpretations of other sources.

The temporal distance between the autoethnographers own data, achieved through her or his own experiences, that of finding and hearing the other voices, and subsequently entering into the imperative dialogue with these data sources, should perhaps be a parameter to consider: they might happen concurrently, or sequentially, and while analytic autoethnography is an expression of the former, it can be argued that the latter equals evocative autoethnography. Thus, in a word, it is suggested that evocative autoethnography is in some contexts a phase an analytical autoethnographer goes through, on her or his way from own experiences towards a grander, more complete and transferable understanding of the phenomena being scrutinized: It depends on the mindset of the researcher, primarily, whether one is eventually committed to analysis, or whether one is convinced of the knowledge value in the non-generalizable narrative.

Commitment to an Analytical Agenda

This kind of value, commitment or conviction is the final defining point of analytical autoethnography, according to Anderson (2006):

> "The purpose of analytical ethnography…is to use empirical data to gain insight into some broader set of social phenomena than those provided by the data themselves. This data-transcending goal has been a central warrant for traditional social science research" (2006, p. 387).

Linking to the above issue of dialogue, Anderson continues to define this as a distinguishing feature between evocative and analytical autoethnography: "Analytic autoethnographers are not content with accomplishing the representational task of capturing 'what is going on' in an individual life or social environment" (2006, p. 387), and reverts to the overall question of generalization by noting that

> "the definitive feature of analytic autoethnography is this value-added quality of not only truthfully rendering the social world under investigation but also transcending that world through broader generalization" (Anderson, 2006, p. 388),

and concludes his argument by stating that "analytical autoethnography does contribute to a spiraling refinement, elaboration, extension and revision of theoretical understanding" (2006, p. 388).

In brevity, Anderson thus argues for the scientific quality of analytic autoethnography, and sets it aside from the school and scholars of the evocative autoethnography orientation, and the issues more traditional academics places on this form of science.

Validity and Reliability

Readers Note

Obviously, validity and reliability are core concerns for any science and any scientist, from the very pragmatic view that if one's claims of knowledge are invalid or unreliable, irrespectively of whether the reason is due to methodological flaws, insufficient analysis or any other fundamental shortcoming, the work done makes no contribution to science, and is thus useless.

In the present case, the burden to demonstrate validity and reliability may well be even more pronounced: Not only is reflective practice, whether augmented by autoethnography or not, a departure from the tradition of positivism and quantitative science (Bullough & Pinnegar, 2001; Stringer, 2007; Zuber-Skerritt, 2001), and hence from the commonly used validity framework, but both of these sciences are furthermore characterized by being internal to the researcher, adding to the challenge of demonstrating validity and reliability. "Self-study researchers inevitably face the added burden of establishing the virtuosity of their scholarship within and through the writing itself" Bullough and Pinnegar (2001, p. 15) notes in support or this viewpoint.

And yet, the challenge is very clear: As Silverman puts it, "It follows that unless you can show your audience the procedures you need to ensure that your methods were reliable and your conclusions valid, there is little point in aiming to conclude a research dissertation" (2005, p. 209).

The former chapter concludes by finding that the methodologies – reflective practice and autoethnography – are appropriate and scientifically justifiable in the context of collecting field data having insider positionality. This issue being settled, the purpose of this chapter is to answer to Silverman's challenges with respect to reliability and validity, in the light of ethnography and action research, or in other words: "Whether or not (or under what conditions) the ethnographer would expect to obtain the same findings if he or she tried again in the same way" (Kirk & Miller, 1986, p. 69), and "whether or not the researcher is calling what is measured by the right name" (Kirk & Miller, 1986, p. 69).

Is it so in the present case?

Fundamental Quality Considerations

Quality is not an absolute in science, but depends on one's stance.

> "In quantitative methods, the issue of quality is more or less taken for granted, simply because directly embedded in these methods is a variety of tests, some weak, some strong, for validity and reliability" (2010, p. 1),

Lützhöft, Nyce and Petersen note, and continue to state that

> "with qualitative methods…however, it is only possible to measure quality in less direct ways" (2010, p. 1)

Lützhöft, Nyce and Petersen (2010) as such address the issue that the quality of qualitative research all too often is measured by the traditional standards that originally were designed and devised for quantitative studies, and which have their definitions and general paradigm founded in the traditions of experimental and quasi-experimental research (Feldman, 2007). It is important, at this stage, to recollect a main differentiator between quantitative and qualitative research: "Qualitative studies do not measure anything *per se*" (original emphasis) (Feldman, 2007, p. 22), which implies a most significant observation: Quantitative, statistical tests for validity, such as those described by Cook and Campbell (1979), cannot be applied either.

A further limitation, or constraint, on the assessment of quality in the qualitative sciences needs to be observed as well: Within this domain, it is not possible to formulate causal laws, according to Giddens (1979). The argument is that all casual laws operate within certain boundary conditions, which are constituted by the actors, and which regard their actions.

> "Thus, coming to know about the circumstances of a certain situation, and any laws specifying relations in this situation, may alter these relations and ultimately cause any attempt to write causal law to result in failure", Lützhöft et. al (2010, p. 4)

note, the reason being that humans, whether participants or researchers, may use the laws both as a resource and as a realization for and of their actions. Sensibly, in that light, Lützhöft et. al. asks which

options are left, if one wants to study human interaction? – and more so, if one wants to assess the quality of such studies?

There is no fixed answer to that, no single, coherent set of 'qualitative methods' applicable in all analysis of texts, talk and interaction (Peräkylä, 2004). However, as the remainder of this chapter will attempt to demonstrate, it is possible to describe the quality attributes, or concepts, and in some cases also possible to formulate the steps that ought to be taken in order to live up to such quality criteria. The verdict of 'pass' or 'fail' is nevertheless not objective: In the spirit of things, this judgement is not quantifiable, but only qualifiable. With certain pragmatism, Hammersley deliberates this subject, by reflecting that

> "[I] recognize that we can never know with certainty whether (or the extent to which) an account is true; for the obvious reason that we have no independent, immediate and utterly reliable access to reality. Given that this is the situation, we must judge the validity of claims on the basis of the adequacy of the evidence offered in support of them" (1992, p. 69).

Hammersley's point is of decisive importance, and has far-reaching consequences: It moves the focus of quality assessment from the findings of the research themselves to the evidence of the findings which is being presented, or otherwise made available for scrutiny.

In a case such as the present, this view supports the notion that judgement of the validity resides with the reader as much as with the writer: The evidence – being the narratives, experiences and reflections, the arguments presented and the underlying literature being quoted or otherwise considered – can be presented by the author, but only the reader can weigh the adequacy, and decide for himself whether this is sufficient to be considered acceptable, well-grounded and relevant (Polkinghorne, 2003a).

The process of weighing the evidence is however not one that is unguided: There is a literature on validity considerations and construction relevant to the two sciences applied in the present case: Action Research (being the umbrella under which Reflective Practice shelters), and Ethnography, being the fundamental paradigm autoethnography belongs to. Not surprisingly at all, these two distinct sciences have their distinct quality considerations and criteria, but at the interface between the two, which is being discussed here, it is suggested and argued that those quality considerations are largely reconcilable.

Prior to that, however, it may be appropriate to recall that the scope of quality being sought is limited to what traditional science calls 'internal' (Lützhöft, et al., 2010) – 'external' validity, transference or generalization (Lützhöft, et al., 2010; Polkinghorne, 2003a), is not pursued at this stage. Correspondingly, this means that the consideration of quality factors and issues relevant to the inductive quality of the data is given less focus in the remaining part of the chapter – however by intention, rather than by neglect.

Definition: Reliability

According to the Oxford Dictionary of English, reliability means "consistently good in quality or performance; able to be trusted". The academic usage of the word is not far from the lay practice. "In qualitative research", Lützhöft, Nyce and Petersen (2010, p. 8) note, "reliability can be defined as the degree to which a finding is independent of accidental circumstances of the research", i.e. a measurement of consistency. This matches the understanding provided by Kirk and Miller, who asks whether the researcher, all other things being equal, would expect to get the same results if the same study was repeated in a comparable fashion (1986).

Adapted from Lincoln and Guba (1985), Fishman (1999, p. 162) equates reliability with the hermeneutic concept of dependability, which he defines as the establishment "that the process of how the study was conducted is documented in such a way that this process can be tracked and reconstructed by a research auditor".

Introducing an argument originally devised by Fetterman (1998), Lützhöft, Nyce and Petersen (2010) further amplifies the consistency attribute of dependability, and ties that particular issue to ethnography, by arguing that

> "Finding consistency, but not necessarily agreement, in patterns of thought and behavior of subjects is key to reliability in ethnography whether we are talking about it as a field method or as a form of analysis"

Definition: Validity

Validity means "actually supporting the intended point or claim; acceptable as cogent", according to the Oxford Dictionary of English, and "well-grounded or justifiable; being at once relevant and meaningful" according to Merriam-Webster's 11th Collegiate Dictionary.

Transposing and combining the above could result in a validity definition along the lines of 'acceptable, well-grounded and relevant', or, in broader terms, whether the item being scrutinized is conveying an acceptable, well-grounded and relevant knowledge claim. Lincoln and Guba (1985) defines validity as trustworthiness or accuracy, and Hammersley suggests a definition which is neither far from that nor from the above musings, by stating that

> "An account is valid or true if it represents accurately those features of the phenomena that it is intended to describe, explain or theorize" (1992, p. 69).

Wisely, though, Heikkinen et. al. puts this in a philosophical context by noting that "…'truth' might not be anything permanent, standing, constant, unchangeable or stable. Rather, it might be something shifting and transient" (2007, p. 18).

Quality Concepts in Ethnography

Within ethnography, of which analytical autoethnography is a subform (Anderson, 2006), Lützhöft et. al. (2010) suggest that the application of four validity criteria combines to yield a valid assertorial argument (Polkinghorne, 2003a), and thus offers an alternative to more standard measures of quality.

These four criteria, originating with Lincoln and Guba (1985), and supported by both Hammersley (1992, pp. 63-64) as well as Fishman (1999, p. 162), comprises the concepts of credibility, transferability, dependability and confirmability.

In Hammersley's words, credibility is the issue of whether the people studied find the account produced to be true, transferability is the hermeneutical equivalent of generalization, empowered by a Geertzian 'thick description' (Geertz, 1983), and confirmability is the issue of whether inferences based on the data are logical and of high

utility. As noted above, dependability is the question of documentation and traceability of the research undertaken.

Quality Concept in Ethnography (Lützhöft)	*What a Researcher should do*	*How to accomplish this*
Credibility	Show isomorphism between respondents views and researchers reconstruction	Prolonged engagement, persistent observation, triangulation (methods, sources, investigations)
Transferability	Provide a thick description from which generalization can be derived	Not stated
Dependability	Enable tracking and reconstruction of research process	Careful documentation, research auditor
Confirmability	Show that inferences based on the data are logical and of high utility	Not stated

Table 3 - Quality Considerations in Ethnography, adapted from (Lützhöft, 2004, p. 28)

Quality Concepts in Analytical Autoethnography

Acknowledging that analytical autoethnography is a subform of ethnography (Anderson, 2006), it is tempting to assume that the quality criteria relevant to ethnography are directly applicable also in analytical autoethnography – which means that the concepts of credibility, transferability, dependability and confirmability should be appropriate without further ado.

It is however not necessarily so.

Consider, initially, the question of credibility: Clearly, the ethnographer should have a prolonged immersion in the research setting, as called for by Fishman (1999), but in the case of autoethnography, this is implicit for complete member researchers (Adler & Adler, 1987). Just as clearly, the observation should be persistent, but the result of the observation – that those studied should find the representation true – makes only limited sense: Who should the researcher consult with regard to 'truth' in a self-study, other than herself, or himself?

As the remaining part of this chapter will show, credibility is not the only quality concept that could be subject to reinterpretation in the context of auto-science: Transferability takes on a two-stage disguise, it is suggested, and confirmability becomes linked to the pragmatic outcome of the inquiry. Even the concept of dependability, it is argued, is affected by the autoethnographic perspective.

The Stance on Quality Concepts

Credibility

If the thinking behind the concept of credibility – "a demonstration of isomorphism between respondents views and the researchers reconstruction" (Lützhöft, 2004, p. 28) – is pursued with the mindset of self-study, I suggest that the philosophically sustainable outcome becomes the question of whether or not the auto-scientist herself, or himself, believes in the representation and finds it to be true – accepting that there are no-one else to ask. Demonstration of credibility becomes, in this way, a question of demonstrating ones own belief in the findings as 'true'.

Transferability

The point that the auto-scientist is 'alone' furthermore affects the concept of transferability to some extent, or, to briefly use the positivistic term, it has an influence on the 'external': The auto-researcher herself, or himself, constitutes the setting, the 'internal', and deductively, anybody else is in principle the 'external' – which implies that the process served by providing the representation for someone else to read, see or hear, is in principle transference, a line of thinking that appears sound even in research cases where only a single case is observed.

For the purposes of this thesis, this process of transferring the observations from the field, and their findings, from the internal of the researcher to the external sphere will be named 'conveyance'.: Conveyance does not make claims on the applicability of findings beyond the original setting, but confines itself to provide the assertorial argument required to gain the acceptance of the 'audience' in the particular case (Polkinghorne, 2003b).

Thus, conveyance is set apart from the traditional understanding of transference, which implies the inductive utilization of findings from one case to many, or, in other words, that the findings of the inquiry in question not only hold for the subjects or situations examined, but also for others not examined: Assertorial claims of this nature are based on the equivalence of essential subject characteristics of those investigated to those in the generalized group (Polkinghorne, 2003a).

Eventually, this could mean that in self-study, the current transferability concept becomes divided into two, one – conveyance – being concerned with 'telling the story' to the 'externals', and one, which for the purpose of this thesis will be named 'applicability', being concerned with generalization in the traditional sense of transferability. Irrespectively of whether applicability is being sought in the individual case, however, conveyance is a required part of any ethnographic or autoethnographic undertaking. Even in the first stage, however, this demonstration could become the question of demonstrating 'thickness' (Geertz, 1983), as required by Fishman (1999), as well as other scholars (Lützhöft, 2004; Lützhöft, et al., 2010).

The Requirements to the Representation

The implication of this line of reasoning is that credibility and transferability in autoethnography might be more deeply intertwined, and that the requirements to the auto-scientific representation might be more severe than in ethnography at large, since it is in the representation that the researcher's voice is to be heard, and it is through the representation that credibility has to be demonstrated – there is no additional mechanism to 'check' the isomorphism between the respondent and the researcher. Arguably, in auto-science, credibility becomes the question whether or not the representation is true to the researcher himself, or herself, while transferability becomes the question of whether or not 'externals' are given sufficient insight to appreciate why this is so.

The narrative, the account or whichever representational means the auto-researcher uses becomes in this fashion the single source of evidence to be assessed with respect to the 'trueness' of the researcher himself. "An audience is convinced of the correctness of a claim when it deems the strength of the case presented for the claim is sufficient", Polkinghorne (2003b, p. 21) states, and the point being suggested here is that unless the representation provides the reader with an honest and

unfiltered view into the mind of the auto-scientist, credibility cannot be established. Bullough and Pinnegar (2001), in their pursuit of quality in narrative, appear to concur, suggesting that "Autobiographical self-studies should ring true…", and arguing that "…the author must take an honest stand" (2001, p. 16). The issue is further elaborated by noting that "Authentic voice is a necessary…condition for the scholarly standing" (Bullough & Pinnegar, 2001, p. 17).

Conversely, if an inside view is available, conveying what it was like to undertake the inquiry, the assessment of credibility – 'trueness' – can actually be undertaken: Such a representation, given that it depicts the auto-researcher with the necessary honesty, insight and richness, "helps the reader to walk for a while in the writer's or artist's world, sharing his enterprises and methods, seeing as he sees" (Schön, 1983, p. 314) - to which it is tempting, and perhaps even reasonable, to add 'and thereby being provided with an insight that could promote understanding of why he thinks as he thinks'.

Demonstrating Quality through the Representation

The above train of thought could indicate that the tool needed for the assessment of credibility and transferability in auto-sciences is the same: A rich representation (Geertz, 1983).

Relevantly, and noting the prominence of narratives in self-study work, Bullough and Pinnegar (2001) are concerned with the quality of such representation, which has caused them to formulate "guidelines that we believe point towards virtuosity in scholarship", as they phrase it (2001, p. 16). It should however be noted these guidelines are value attributes to the quality concepts of credibility and transferability, rather than expressions of validity in their own right (Feldman, 2003) – even though Polkinghorne agrees with Bullough and Pinnegar (2001) by noting that validity, at the end of the day is a question of passing the muster of scholarly critique (Polkinghorne, 2003a) .

Transferability (Convergence) and Dependability

With respect to the reinterpreted concept of transferability (convergence), as per the above, it is noted that "Self-studies [narratives] should promote insight and interpretation" (Bullough &

Pinnegar, 2001, p. 16) and that "Powerful autobiographical self-studies…include dramatic action: Something genuine is at stake in the story" (Bullough & Pinnegar, 2001, p. 17). Heikkinen et. al. concur and advocate the use of artistic and evocative criteria for the evaluation of qualitative research. In particular, they find that "good research awakens and provokes a person to think about things in a new and different way", and continues that "The most significant learning experiences are always both cognitive and affective in nature", noting that science comes close to art in the narrative framework (Heikkinen, et al., 2007, p. 16)

As far as Bullough and Pinnegar (2001, p. 19) are concerned, self-study representation in the form of narrative is scholarly, or of research quality, when it follows a particular 'recipe':

> "A self-study is a good read, attends to the 'nodal moments'…and thereby enables reader insight or understanding into self, reveals a lively conscience and balanced sense of self-importance, tells a recognizable…story, portrays character development in the face of serious issues within a complex setting, gives place to the dynamic struggle of living life whole, and offers new perspectives"

Feldman (2003) augments Bullough and Pinnegar's suggestion by adding a methodological requirements to the process of producing the representation, the argument being that "we need to do more than represent our findings; we must demonstrate how we constructed the representation" (Feldman, 2003, p. 27):

> 1. "Provide clear and detailed description of how we collect data…either within the text itself or as an appendix, provide details of the research method used.
> 2. Provide clear and detailed descriptions of how we constructed the representation…It is not always obvious how an artistic representation of research as arisen from the data. It would add to the validity of the representation if readers had some knowledge or insight into the way the researcher transformed data into an artistic representation" (Feldman, 2003)

While Feldman (2003) perhaps is expressing what merely ought to be good research practice, I nevertheless acknowledge the value of transparency by including it in this context: If the reader, listener or viewer of a representation is privy to the constructional process, from

the raw observations to the glossy result, (s)he can form an opinion about the researchers own belief, in turn lending credibility and trueness to the work done (Heikkinen, et al., 2007).

This need for transparency is noted by Anderson (2006) as well, in the context of having a 'Visible and Active Researcher in the Text'. Anderson, it appears, suggest that unless the role of the autoethnographer is transparent, it is impossible to judge to what extent the phenomena observed and reported are concrete, or interpretations made by the ethnographer.

It is an open point to which extent the introduction of Feldman's (2003) well-founded focus on method affects the dependability of the representation, but I suggest that the transparency needed to satisfy Anderson's and Feldman's requirements at the same time provides at least partial fulfillment of the dependability criteria – knowing the nuts and bolts of data collection and data analysis takes a research auditor some way towards reconstruction, which is the means to fulfill the original dependability concept (Fishman, 1999). Considering also Bullough and Pinnegar's 'recipe' for scholarly narrative, I further suggest that the combination could be taken as a guideline for the sufficiency of richness, or 'thickness', of auto-scientific representation.

Credibility and Confirmability

While the application of this 'richness criteria' might be used to assess the convergence of auto-research findings, the question relating to credibility remains: How to document the researchers own belief in the representation?

Documenting the researchers own belief in the trueness of his own work is obviously a sensitive and delicate matter. Not only should the potential temptation to 'enhance' field data be ignored, but the more innocent self-delusion should also be taken into account. In response to the four potential advantages a practitioner might have in a research context (see the section named 'Knowledge and Practice; Knowledge in Practice', starting on page 119), Hammersley (1992) notes a number of corresponding pitfalls:

1. "…the relationships available to the practitioner will exclude as well as include, and may not include what is necessary for research purposes…some of these relationships may place constraints on the

inquiry…what is required to test theoretical ideas may well conflict with what is needed for good practice…"

2. "The information that practitioners have about the situation they operate in is a product of experience deriving from a particular role…that will have given access to some sorts of information but not to others…[and] their understanding of the perspectives of other categories…may be superficial or distorted…"
3. "People can be wrong even about their own intentions and motives; self-knowledge is not immediately given and therefore valid…people can deceive themselves…[and] may often have an interest in such self-deception…" (Hammersley, 1992, pp. 144-145)

Each of these observations is valid in the present context, and any practitioner, or auto-scientist, will have to navigate carefully round them, in order to demonstrate a satisfactory level of credibility. It is however suggested that Hammersley's pitfalls can be used as check-marks for demonstrating the desired own belief in trueness of the representation:

The first point appears to bear a resemblance to the completeness or effectiveness of the research performed, or, arguably, the outcome of the practice being studied. In the context of a practitioner, the outcome could be a practical one, or it could be one of personal change, a demonstration of learning. A presentation of the evidence of the value of such a change would help to convince readers of the validity of a narrative (Feldman, 2003). Borrowing from the action research sphere, this issue corresponds to 'outcome validity', which (see also below) is defined as whether the action undertaken "leads to a resolution of the problem that led to the study" (Herr & Anderson, 2005, p. 55), or 'workability', which Heikkinen et. al. (2007) point out has a relationship to trueness for the pragmatist: The concept of pragmatism dates back to the Greek antiquity, the word 'Pragma' in itself meaning 'true'. Polkinghorne phrases it differently, but the meaning remains: "…the final test of a claim's validity is that actions based on it actually produce the intended result" (2003b, p. 24). Thus, in case the self-study researcher can demonstrate outcome validity or workability, it is suggested that this also demonstrates his own belief in the trueness of representation. Considerations regarding the implication of achieving a pragmatic result are furthermore closely related to the utility of the research. It is thus suggested that the quality criterion of

confirmability is at least partially satisfied if workability can be adequately demonstrated.

The second point relating to Hammersley's (1992) potential pitfalls for the practitioner researcher is essentially one of earnest dialogue, of hearing other voices, and taking them duly into account. This point appears to match closely to Anderson's (2006) requirement of 'Dialogue with Informants beyond the Self', and fulfillment of one, I suggest, thus implies fulfillment of the other as well. The issue at hand relates, in a sense, to the transition from evocative auto-science to analytical auto-science, where the former "seeks narrative fidelity only to the researcher's subjective experience" and the later "is grounded in self-experience, but reaches beyond it as well" (Anderson, 2006, p. 386). However, as argued previously, the transformation from the evocative to the analytic is not necessarily a result of one's research stance, but may also be a temporal one: evocative auto-science may be a stage rather than a terminal. The implication of this position is essentially that the issue of multiple voices, of participation and collaboration, is void as long as one is in the evocative stage, and only becomes applicable when the second stage of transference – application – is attempted. Here, though, other voices should be clearly seen, felt and heard, and their impact on the auto-researcher should be made clear.

Hammersley's (1992) final point is also the most complicated from a demonstration point of view: How does one justify that one's picture of the world is not self-deceptive? Part of such a demonstration, I suggest, is provided by following Feldman's (2003) directions for using a proper method transparently: This provides an option for the 'external' to form an opinion about the trueness of the representation. Nevertheless, this provision of an auditing option does not help the researcher herself, or himself, in fighting, managing and controlling self-deception.

Reflection might do this, though.

As previously noted, Schön (1983) argues that reflection is not only the key to knowledge generation, but also the means to overcome selective inattention to phenomena that do not fit the categories of his knowing-in-action, resulting in narrowness and rigidity. This description, I suggest, is comparable to one of self-deception, and the bulwark against its ill effects is the same:

> "Through reflection, he [the practitioner] can surface and criticize the tacit understandings that have grown up…" (Schön, 1983, p. 61).

There are, Schön continues, multiple possible objects for the practitioner's reflection, but they include the introspective quality required to mitigate self-deception and provide enhanced and deeper self-knowledge:

> "…he may reflect on the tacit norms and appreciations which underlie a judgement, or on the strategies and theories implicit in a pattern of behavior. He may reflect on the feeling for a situation which has led him to adopt a particular course of action, on the way in which he has framed the problem he is trying to solve, or on the role he has constructed for himself within a larger institutional context" (Schön, 1983, p. 62).

In concurrence, Moon (2004) defines reflection in an academic context as involving "a conscious and stated purpose for the reflection, with an outcome specified in terms of learning, action or clarification" (2004, p. 83) – an outcome she suggests can include "a process of critical review… personal and continuing professional development…and clarification and the recognition that there is a need for further reflection" (2004, p. 84).

Promoting what he labels the "Reflexive Principle", Winter (2002) is in agreement with both Schön and Moon when he suggests that reflection is the means towards 'truth'. In particular, Winter advocates that the "'discipline' of the research process…becomes that of *self-questioning*" (original emphasis) (2002, p. 152), and he elaborates by arguing that

> "Each 'voice' has to question itself…it follows that the voice of the researcher is required to be a self-questioning voice…so that the research text is above all tentative, modest in its 'claims to know'…" (2002, p. 152)

Supplementing the view of Winter, Heikkinen et. al. observe that "It is a researcher's virtue to be aware of how he/she produces reality – and to explicate his/her personal process of knowing in the text" (2007, p. 11).

The emergent picture is all in all supportive of reflection as a potential cure against self-deception, and it is furthermore suggested that this approach meet with the endorsement of Atkinson, Coffey and Delamont (2003, p. 62), recalling their view on inward focus:

> "Ethnographers-as-authors frame their accounts with personal reflexive views of the self. Their ethnographic data are situated within their personal experience and sense making. They themselves form part of the representational process in which they are engaging and are part of the story they are telling."

A final issue appears to be resolved by the insistence on reflection: Anderson's (2006) requirement to analytical reflexivity in the conveyance phase of autoethnography, through a thoughtful dialogue with the self, attempting to understand the coupling between the researcher and the research situation, and how they might influence each other.

This being settled, the issue immediately becomes the one of qualifying reflection – it is, as earlier stated, not enough to stroll in the park in a reflective mood to further science (Moon, 2004). Building on the work of Hatton and Smith[23], Moon describes four levels of reflection:

- "Descriptive writing – writing that is not considered to show evidence of reflection. It is a description with no discussion beyond description.
- Descriptive reflection – there is description of events. The possibility of alternative viewpoints is accepted but most reflection is from one perspective.
- Dialogic reflection – the work demonstrates a 'stepping back' from events and actions leading to a different level of mulling about discourse with self and exploring the discourse of events and actions. There is a recognition that different qualities of judgement and alternative explanations may exist for the same material. The reflection is analytical or integrative, though may reveal inconsistency.
- Critical reflection – 'demonstrates and awareness that actions and events are not only located within and explicable by multiple perspectives, but are located in and influenced by multiple historical and socio-political contexts'" (2004, p. 97).

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23. Hatton, N. and Smith, D. (1995) 'Reflection in teacher education – towards definition and implementation', *Teaching and Teacher Education,* 11 (1), 33-49.

The above should be understood as a continuum, stretching from zero to infinity – there is no (known) limit to the depth of reflection. Its potential usefulness comes, it is argued, from the suggestion that an increasing depth of reflection relies on an increasing awareness and sophistication in the internal experiences of the 'reflector' (Moon, 2004) – which, in the current context, means an increasing ability to place oneself correctly within the context one is operating within – and hence a reduction of the risk of self-deception. In a word, the more a representation of research provides evidence of deep reflection, the better the chance that the researcher has reason to believe in the trueness of the representation. If the representation furthermore provides an insight into the reflective process, it is suggested that others also can put faith in the knowledge presented.

Reinterpretation of Quality Concepts in Autoethnography

The above departs in the quality concepts originally described by Lincoln and Guba (1985), as these later on have been interpreted and perhaps finessed (Fishman, 1999; Hammersley, 1992; Lützhöft, 2004; Lützhöft, et al., 2010), and moves on to consider the four concepts of credibility, transferability, dependability and confirmability in the light of self-study, as this takes place in the impact zone between the ethnographic and action research spheres.

Pivoting round the notion that credibility in more traditional research is depending on whether or not the people being studied find the resulting account to be true (Hammersley, 1992), but that this philosophically is impossible in self-study, considering that there is no-one else to ask, a set of reinterpretations, relevant to self-study are suggested. They involve, in way of credibility, that the auto-researcher needs to demonstrate own belief in the trueness of the representation through documented learning, change and evidence of reflection of an adequate depth (Moon, 2004). Considering transferability, this concept is reinterpreted to gain a second dimension of conveyability, apart from the traditional one of inductive generalization (here named applicability) from the examined subject(s) and setting(s) to a larger population that is not significantly different with regard to the phenomenon being considered: that of telling the story from the internal (the researcher) to the external (which means everybody else), richly and transparently (Bullough & Pinnegar, 2001), even on a single case of observation. Dependability, it is suggested, must include

descriptions that promote transparency (Feldman, 2003), while confirmability to some extent, at least, must be demonstrated by the workability of the research undertaken (Heikkinen, et al., 2007). Table 4 shows a condensed view of these suggestions, which, it is proposed, at the same time constitutes the aspects that must be considered to provide an assertorial argument (Polkinghorne, 2003a, 2003b) for validity and reliability in auto-science.

Quality Concept in Autoethnography	*What a Researcher should do*	*How to accomplish this*
Credibility	Demonstrate auto-researchers belief in the representation	Complete Member Researcher (Adler & Adler, 1987), inward focus (Atkinson, et al., 2003), persistent observation, adequate depth of reflection (Moon, 2004).
Transferability (Conveyability)	Provide a thick description	Rich and unfiltered representation according to Bullough & Pinnegar (2001) and Feldman (2003).
Dependability	Enable tracking and reconstruction of research process	Careful documentation, research auditor, transparency according to Feldman (2003); visible researcher according to Anderson (2006).
Confirmability (Workability)	Show that inferences based on the data are logical and of high utility	Demonstrate workability according to (Heikkinen, et al., 2007).

Table 4 - Quality Considerations in Autoethnography

Quality Concepts in Insider Action Research

If one moves on, with the above in mind, and judges an inquiry like the present by the quality concepts contained in Table 4, one would not be half wrong – but, however, one would only be half right as well: The findings above are rooted in the ethnographical domain, primarily, and do not necessarily have the applicability in the action research domain that indeed also should be considered, acknowledging the roots of reflective practice (Herr & Anderson, 2005).

The purpose of this section is to accomplish this step, by initially considering quality concepts within insider action research, followed by a corresponding exercise with regard to action research in the disguise of reflective practice. Once accomplished, the eventual goal is to attempt to reconcile the quality concepts from this subform of action research with those derived for self-study ethnography, in the hope that a unified set of criteria can be described: If indeed there are close links and a blurred limit between these two research paradigms, one would deductively expect a certain similarity in the judgement of quality as well.

In the general sense, action research operates with the same validity constructs as other branches of social science. Credibility is defined "as the arguments and the processes necessary for having someone trust research results", according to Greenwood and Levin (1998), credibility by itself being subdivided into internal and external validity. Internal credibility is defined as local, in the sense that knowledge has to be credible to the creators, while external credibility is defined as "knowledge capable of convincing someone who did not participate in the inquiry that the results are believable" (Greenwood & Levin, 1998, p. 81).

Within the sphere of action research, Reason and Bradbury (2006) describe five distinct quality considerations in a widely cited piece, and simultaneously makes it clear that these points are 'choice points', open for and meant to be debated and applied individually: "no action research project can address all issues equally and… choices must be made about what is important in the emergent and messy work of each action research project" (2006, p. 349).

Acknowledging that the five considerations put forward by Reason and Bradbury (2006) are developed out of their experience with Participatory Action Research (PAR), Herr and Anderson (2005) suggest another five criteria "developed out of more insider action research studies" (2005, p. 58), and hence of higher relevance in the present context. The concepts defined includes dialogic validity, outcome validity, catalytic validity, democratic validity and process validity (Herr & Anderson, 2005, pp. 55-57) (see also Table 5).

The criteria suggested by Herr and Anderson are, like those put forth by Reason and Bradbury (2006), "are in a flux" (Herr & Anderson, 2005, p. 57), are "tentative and meant to democratize action research", and are offered to "open up dialogue with both academics and practitioners" (2005, p. 54). This invitation will be accepted in the following section, where the original criteria will be fused, or

elaborated, with quality concerns and observations made by other researchers, who are similarly concerned with the validity and reliability of action research, notably Zuber-Skerrit and Fletcher (2007), Feldman (2007), Coghlan and Brannick (2005), Greenwood and Levin (1998), Heikkinen, Huttunen and Syrjälä (2007) and McNiff, Lomax and Whitehead (2003).

Quality Concept in Insider Action Research (Herr and Anderson)	*What a Researcher should do*	*How to accomplish this*
Dialogic Validity	Critical and reflexive dialogue.	Peer review; critical friends.
Outcome Validity	Generate an action that leads to a resolution of the problem.	Not stated.
Catalytic Validity	Demonstrate that the action led to education/learning of both participants and the researcher herself/himself.	Careful documentation; research journal.
Democratic Validity	Demonstrate that multiple perspectives are taken into account.	Not stated.
Process Validity	Use a sound and appropriate research method.	Not stated.

Table 5 - Quality Considerations in Insider Action Research (Herr & Anderson, 2005)

Dialogic Validity in Insider Action Research

Dialogic validity relates, according to Herr and Anderson (2005), to the issue of the 'goodness of research' in insider action research, achieved either through peer review, through the use of critical friends, or through critical and reflexive dialogue with other action researchers. All of these processes, it is suggested, are to play the 'devil's advocate', in order to widen the researcher's consideration of alternative explanations of research data, or in other words, to obtain, or maintain, multiple perspectives.

There is no discussion about the desirability of multiple perspectives, but one could reasonably ask how this need, as a quality concept, is fulfilled in practice. Peer review, as well as critical and reflexive dialogue with others, and indeed with other action researchers,

demands that some kind of representation is available: it is through this medium discourse takes place, and upon which review is based.

Hence, the representation should sustain the multiple perspectives, and in the preparation of the narrative, or whichever form of representation the research chooses to utilize, she or he needs to consider her or his own frailty, academically speaking. "The person doing action research should recognize that his or her own perspective is not intrinsically any more true than the perspective of others" Heikkinen et. al. (2007, p. 12) warns, echoing Winter, who in the context of his 'Principle of Reflexivity' cautions that "Like all of the other participants, the report writer does not have a single 'correct' perspective from which to provide an authoritative summary" (2002, p. 148).

Rhetorically, Winter asks the question:

> "So, how can one register the need for a critique of immediate experience without appearing to adopt the stance of one who already posses an enlightened/emancipated perspective, from which the perspectives of others can be dismissed as 'ignorance', 'neurosis', 'false consciousness' or 'delusion'?" (original quotation marks) (2002, p. 148)

and proceeds to answer by suggesting that

> "One way of resolving this dilemma…takes the form of emphasizing the *dialectical reflexivity* of all accounts, including the account presented by the writer of the report" (original emphasis) (2002, p. 148)

In elaboration, Winter continues to define that "The modernist text is *reflexive* in that it does not attempt to create an illusion of an objective reality that has simply been observed and reported" (original emphasis) (2002, p. 150), and concludes, as far he is concerned, by suggesting that

> "The writer of a reflexive text, then, does not seek to hide behind the claim to have described a unified, apparently objective reality, but acknowledges her/his role as the subjective presenter of a *plural* text, which is frankly constituted as a still non-unified assemblage of disparate realities" (original emphasis) (2002, p. 151).

Winter appears to achieve two things in the above. Firstly, he adds a dimension to Herr and Anderson's original dialogic validity criteria, by implying that the criterion of dialogic validity should be formulated to explicitly accommodate the subjectivity of the researcher.

Secondly, Winter closes the circle, so to say, by underscoring the benevolence of plurality and the point of multiple perspectives: The writer's own text should be one of many voices represented, to allow the reader to see and evaluate the breadth and width of subjectivity.

In a slightly wider context, the issue of plurality is a dimension of collaboration and participation in action research, which is advocated by many of the significant authors in this field (Coghlan & Brannick, 2005; Herr & Anderson, 2005; Peter Reason & Bradbury, 2006; Zuber-Skerrit & Fletcher, 2007), formulated by some, it is suspected, out of a political concern relative to the democratization of research, but mostly to avoid the potential pitfalls associated with researchers working alone and potentially self-delusioned.

Outcome Validity in Insider Action Research

Outcome validity, or workability as it is also called (Greenwood & Levin, 1998; Heikkinen, et al., 2007; Herr & Anderson, 2005), is a measure of the extent to which the actions undertaken lead to a resolution of the problem that led to the study, or in other words, whether or not the action eventually was effective, and caused the change it set out to achieve (Greenwood & Levin, 1998; Herr & Anderson, 2005). In the contexts of quality in action research theses, Zuber-Skerrit and Fletcher notes that "the characteristic of a good action research thesis is the identification and solution of a complex problem in the real world or workplace…" (2007, p. 420), which, in a slightly more general sense translates into the notion that good action research must identify, address and resolve a real problem.

In the view of Greenwood and Levin, workability is central to the validity of action research: "…we understand the inquiry process as an integration of action and reflection and the test of the tangible outcome as workability" (1998, p. 82), they advocate, and recalling the arguments relating to the generation of valid knowledge by action (see the section 'Knowledge and Practice; Knowledge in Practice' on page 119), they are hence fundamentally in harmony with this notion, originally described by Schön (1983), and shared and supported by

prominent action research thinkers such as Lincoln and Denzin, Reason and Bradbury, Revans and Polkinghorne.

In terms of scope of workability as a concept, Heikkinen et. al. (2007) widen the pragmatic implication of Greenwood and Levin's (1998) original understanding by suggesting that the 'tangible outcome' is to be interpreted in a rather broad sense: "Sometimes the main consequence might be a critical public discussion or debate…" (2007, p. 14), they suggest, implicitly also acknowledging the affinity between learning, debate and change. Feldman (2007) further ups the ante, by suggesting that the achievement of a 'tangible outcome' in itself is insufficient, or incomplete, without knowing the 'why': The demonstration of workability should not be limited to the mere statement of 'success', but should also provide an explanation or theory of why it worked. This is yet another dimension, which once again stresses the importance of learning and knowledge generation in action research, something that in turn meets with the approval of Zuber-Skerrit and Fletcher (2007, p. 420), who advocate that research should enable action, albeit in a wide sense as well: In their view, action is defined as "practical improvement, professional and/or organizational learning, [and] therefore change or development for the better".

Knowing the 'why' also corresponds to the observations of Anderson (2006), who in the context of analytical autoethnography calls for a 'Commitment to an Analytical Agenda', by which he means that the purpose of research is wider than "the truthfully rendering [of] the social world under investigation" (Anderson, 2006, p. 388): "Analytic autoethnographers are not content with accomplishing the representational task of capturing 'what is going on' in an individual life or social environment" (2006, p. 387), Anderson notes, and concludes by suggesting that "analytical autoethnography…contribute to a spiraling refinement, elaboration, extension and revision of theoretical understanding" (2006, p. 388). One can not help to see the affinity between this world-view and that of reflective practice, and indeed the action research method.

Considering these views under one, workability could be reinterpreted to be an issue of 'whether or not the action had the tangible impact on a real-world problem it was intended to have, in terms of learning, discussion, improvement or resolution, and provided the corresponding theory or knowledge'.

Having established the 'what' of workability, the next issue logically becomes the 'how', or in other words, what a researcher should do to demonstrate workability. Initially, I suggest that one should

realize and accept that this is an issue that can not be designed, or planned, due to the unfathomable complexity and the corresponding number of variables associated with this deceptively simple question: How does one, after all, know whether or not a particular act will be successful, or will backfire?

As a matter of fact, I suggest that one does not. 'Knowing up front' corresponds to reading tea leaves, or a packed deck of cards. There is no sure-fire recipe to follow towards certain workability, and, in consequence, the demonstration of workability can only be undertaken in the cold, clear light of hindsight. This is the crux of action research, and the main reason for iterative nature of the action research process: planning, acting and evaluating (Bargal, et al., 1992; Lewin, 1946): You do not know until you have done it, or as Schön puts it:

> "…research is an activity of practitioners. It is triggered by features of the practice situation, undertaken on the spot, and immediately linked to action" (1983, p. 308).

I suggest that the only thing an action researcher can do is to follow the action research process, and be both meticulous in his work and honest to himself and others, in his field craft as well as in his analysis. I furthermore propose that the action researcher pays particular attention to three stages of his analysis, his 'writing-up' – not as a last-minute affair, but as a continuously process running in parallel with other action research cycles: Journaling, reflection and transparency.

The need for journaling springs from two parts of the reinterpreted definition of workability: the need to document that the problem addressed is of the real-world, and the point that 'learning, discussion, improvement or resolution' necessarily will be assessed as a differential between states, or stages, in the research undertaking. Such comparison will however be impossible unless the researcher's notes, journals and/or other evidence documents these states, essentially meaning that 'snapshots' of important parameters must be included in the field notes. And not lightly, either: "Action research…must be well argued and supported by strong evidence that is convincingly presented" (Zuber-Skerrit & Fletcher, 2007, p. 431).

Furthermore, I suggest that such documentation must be made available to the consumers of the research findings, in order that they can follow the rationale and mindset of the researcher, as reflection takes place. The representation should have verisimilitude, should

"open to the reader as credible in such a way that he/she begins to live vicariously the lives of the protagonists of the story and to understand the motivation of their actions", Heikkinen et. al (2007, p. 17) remarks. This calls for 'thickness', or richness, and a scholarly quality of the representation. In this context, the observation made by Bullough and Pinnegar (2001, p. 19), albeit on self-study, once again springs to mind:

> "A self-study is a good read, attends to the 'nodal moments'…and thereby enables reader insight or understanding into self, reveals a lively conscience and balanced sense of self-importance, tells a recognizable…story, portrays character development in the face of serious issues within a complex setting, gives place to the dynamic struggle of living life whole, and offers new perspectives"

Following the researchers mindset furthermore calls for transparency, as described by Feldman (2003, p. 27): "…we need to do more than represent our findings; we must demonstrate how we constructed the representation". To Feldman (2003), the practical steps to achieve transparency comprise a clear and detailed description of the construction of findings, which I suggest is a component that should be considered with respect to the documentation of workability.

Finally, reflection is of significant importance in the demonstration of workability, on two counts:

Firstly, reflection is what derives the knowledge, the theory, from the action in the field, and in the present case, it is through reflection that Feldman's (2007) requirement regarding the reason for the success of an action is to be fulfilled.

Secondly, reflection is a core activity in action research, the tool used to make sense of the situations the researcher encounters during the inquiry, and the platform on which one stands when the next iteration is planned. If the reflection is shallow or inadequate, the next step is bound to fail, and the action as such will not converge on the intended change or improvement.

In both cases, I suggest that the representation needs to report on reflection in a convincing fashion, and for that purpose, it is once again advocated that Moon's four levels of reflective writing (Moon, 2004, pp. 214-216) are considered useful in this context. Under the headline of 'Contribution to knowledge in theory and practice', Zuber-Skerrit and Fletcher appears to concur, by noting that "reflection be an integral part" (2007, p. 420) of a thesis, or, I would add, of any representation of action research. Considering the quality of reflection,

one should observe that "Reflection needs to be *critical* and *self-critical*" (Zuber-Skerrit & Fletcher, 2007, p. 420).

Catalytic Validity in Insider Action Research

Catalytic validity is a question of professional development in the meaning of learning, or rather, the extent to which professional development or learning takes place: "Not only the participants, but the researchers/practitioners themselves must be open to reorienting their view of reality as well as their view of their role" Herr and Anderson defines (2005, p. 56), and continues "All involved in the research should deepen their understanding…".

On the subject of achieving catalytic validity, Herr and Anderson direct that researchers should recount a spiraling change in their own and their participants' understanding, and adds that

> "This reinforces the importance of keeping a research journal in which action-researchers can monitor their own change process and consequent changes in the dynamics of the setting" (Herr & Anderson, 2005, pp. 56-57).

Seen in the light of the previous discussion about the need for journaling (see the section on Outcome Validity, page 151), a strong overlap seems to exist, at least methodically: The quality, evocativeness and verisimilitude of the representation are all issues enabling the writer's tracking of development and learning, eventually to be considered in the overall judgement of validity. I suggest that the approach is the same as mentioned previously, i.e. the production and presentation of a 'thick', or rich, transparent and credible representation (Bullough & Pinnegar, 2001; Feldman, 2003; Heikkinen, et al., 2007).

Democratic Validity in Insider Action Research

Democratic validity in insider action research refers to the extent to which research is done in collaboration with all the parties who have a stake in the problem under investigation – and, if the research is not undertaken collaboratively (as in the case of auto-science), how multiple perspectives and material interests are taken into account in the study (Herr & Anderson, 2005).

Democratic validity is however also synonymous to the more widely used concept of local validity, "in which the problems emerge from a particular context and in which solutions are appropriate to that context" (Herr & Anderson, 2005, p. 56). Greenwood and Levin's definition of local validity does not deviate much, simply stating, as they do, that "there is knowledge that has *internal credibility* to the group generating it" (1998, p. 80), while Zuber-Skerrit and Fletcher observes that "the results of the research are valid and reliable if they are recognizable and authentic to the people involved in the research, even if not necessarily to others" (2007, p. 423). As can be seen from the three definitions, local validity is a question of the "validity with the study" (Fishman, 1999, p. 161), corresponding to the hermeneutic concept of credibility (Fishman, 1999). As it is, internal validity, local validity or credibility is usually achieved through collaboration (Fishman, 1999; Greenwood & Levin, 1998; Lützhöft, et al., 2010; Zuber-Skerrit & Fletcher, 2007), in which sense action research does not differ from other social science.

This, I suggest, also means that the means to achieve credibility in, for instance, ethnography, will satisfy the requirements in action research as well.

Process Validity in Insider Action Research

Process validity is, as the name suggests, whether a sound and appropriate research method has been applied. It asks about the presence of multiple perspectives, about the use of triangulation, and how the researcher guards against simplistic or self-serving views (Herr & Anderson, 2005). It asks about framing, and about the progression of action research cycles, as well as calling for reflection and consideration of evidence sustaining assertations (Herr & Anderson, 2005).

As the discussion above has unfolded, there is a large overlap between process validity and some of the other quality concepts considered. An obvious dependency is that outcome validity depends on process validity: If the process is skewed, superficial or flawed, the outcome will reflect this (Herr & Anderson, 2005). A critical component of the reinterpreted definition of outcome validity (see page 151) calls for reflection as mitigation, covering this aspect of process validity. The need for multiple perspectives is an issue discussed in relationship to dialogic validity, as is the explicit expression of subjectivity as a way of handling the issue.

This being noted, what remains is the 'bare' requirement towards the method, in terms, I suggest, of applicability as well as in execution.

When it comes to methodological applicability, and implicitly the choice of method as such, I find that avoiding compromise is of the outmost importance. There has to be a natural affinity between the philosophy of the method, and the researcher's world-view. If it is not so, I suspect that the hardship of staying within the narrow path of virtue in some cases might compromise quality. I suggest this issue calls personal and professional ethics, for seeing oneself clearly, of understanding one's role, values, subscriptions and preferences, as a person and as a scientist. It is, once more, an issue of avoiding self-delusion, and the tool, I advocate, is reflection (Moon, 2004) and transparency (Feldman, 2003). From the above discussion about subjectivity, it is a clear requirement that the researcher makes his subjective position known to himself, and to his readers (Winter, 2002). A further issue is to accept that research comes as a package, in the sense that certain norms, conventions or traditions should be observed – and in cases where they are not, that a sustainable argument must be given. As mentioned previously, Bullough and Pinnegar (2001, p. 15) state a principle which I find myself not only subscribing to, but also advocating: "Scholarly integrity requires that where methods are borrowed, established research practices be respected", and, supportively, that "…the standards of scholarship of the embraced tradition still must be met".

When it comes to the execution of one's chosen method, Bullough and Pinnegar's notion remains, albeit without the 'borrowed': One must follow established practice, one must meet the standards of scholarship, and one must, above all, in my view, argue one's stance and actions – not only where one deviates, if and when that happens, but also when one does not.

In the context of the present thesis, one should not ignore the issue that here – as in other theses – entire sections are devoted to the justification and deliberation of one's method, it's mechanisms, it's application and so forth. I suggest that this tradition should not be forgotten in other scientific writings.

Synthesis of Quality Concepts in Insider Action Research

Quality Concept in Insider Action Research	*What a Researcher should do*	*How to accomplish this*
Dialogic Validity	Maintain multiple perspectives. Demonstrate awareness of writer's subjectivity.	Peer review; critical friends. Acknowledgement of writer as subjective presenter of a non-unified assemblage of disparate realities (Winter, 2002).
Outcome Validity (Workability)	Demonstrate that the action had the tangible impact on a real-world problem it was intended to have (learning, discussion, improvement or resolution), and provided the corresponding theory or knowledge.	Hindsight through/analysis of rich and unfiltered documentation (Bullough & Pinnegar, 2001), transparency according to Feldman (2003), adequate, self-critical reflection (Moon, 2004; Zuber-Skerrit & Fletcher, 2007).
Catalytic Validity	Demonstrate that the action led to professional development/learning of both participants and the researcher herself/himself.	Careful documentation and research journal, rich and unfiltered representation according to Bullough & Pinnegar (2001), Heikkinen et. al (2007) transparency according to Feldman (2003).
Democratic Validity (Local validity)	Show isomorphism between respondents views and researchers reconstruction	Prolonged engagement, persistent observation, triangulation (methods, sources, investigations)
Process Validity	Use a sound and appropriate research method.	Reflection (Moon, 2004), transparency (Feldman, 2003), awareness of subjectivity (Winter, 2002), respecting practice (Bullough & Pinnegar, 2001).

Table 6 –Synthesized Quality Considerations in Insider Action Research

Quality Concepts in Self-study Reflective Practice

The purpose of the previous exercise was to elaborate the original suggestions of quality concepts in insider action research, as put forth by Herr and Anderson (Herr & Anderson, 2005). It was achieved by discussing the criteria in the light of suggestions and concerns developed a range of important action researchers: Zuber-Skerrit and Fletcher (2007), Feldman (2007), Coghlan and Brannick (2005), Greenwood and Levin (1998), Heikkinen, Huttunen and Syrjälä (2007) and McNiff, Lomax and Whitehead (2003).

Considering the nature of this thesis, it would be both logical and reasonable to perform a similar discussion of the reinterpreted quality concepts in the light of reflective practice, but it should be recognized there does not appear to be a comprehensive literature on this particular subject, neither regarding Reflective Practice as a general discipline, or the self-study subset thereof. Or rather, if there is, I have been unable to identify it.

As such being left to own devices, the next best thing appears to be an examination of the practicality of the reinterpreted concepts, in the light of a self-studying reflective practitioner.

Dialogic Validity in Self-study Reflective Practice

Within the context of insider action research, the above established that dialogic validity comprises two distinct components: the correct accommodation of the writer's subjectivity, and the desirability, or indeed necessity, of plurality, of multiple perspectives – many voices should be represented, to diminish the bias of the writer, or at least to make it plainly visible and obvious. It becomes a basic question of authenticity, which Zuber-Skerrit and Fletcher defines pragmatically: "the results of the research are valid and reliable if they are recognizable and authentic to the people involved in the research, even if not necessarily to others" (2007, p. 423).

In the context of reflective practice, however, plurality is however usually not a solution. As has been noted previously, the auto-

scientist has by definition no-one else to ask[24]: adding other voices is a question of applicability[25], or about the transition from evocative auto-science to analytical auto-science, from conveyance to application, and by deduction, dialogic validity in self-study reflective practice is fulfilled 'if they [the results] are recognizable and authentic to the researcher, even if not necessarily to others'.

This view does however not exclude that Winter's (2002) view on subjectivity still holds true; quite the contrary in fact: there is no reason why results that are recognizable and authentic to the researcher cannot be framed in understanding of one's own subjectivity, in an explicit fashion. A rephrase of Winter's (2002) notion could well become 'The reflective practitioner, then, does not seek to hide behind the claim to have described an apparently objective reality, but acknowledges her/his role as the subjective presenter', and in combination with Zuber-Skerrit and Feltcher's view, one could formulate the quality concept to become 'in self-study reflective practice, the results of the research are valid and reliable if they acknowledge subjectivity, and are recognizable and authentic to the researcher'.

Demonstrating this kind of honesty, of awareness of one's own position, ones feelings, understandings and potential biases, I suggest, is however identical to demonstrate that one does not delude oneself.

Thus, springing from the need to handle subjectivity, recognizing that the researcher is alone in self-study reflective practice, and thus is barred from the utility of plurality, the chain of reasoning becomes a repetition of the argument regarding credibility in autoethnography presented above (see the section on 'Demonstrating Quality through the Representation' on page 139). As a consequence, the means are also the same: The reflective practitioner, some would say obviously, needs to handle his subjectivity through a demonstration of reflection of an adequate depth (Moon, 2004), something which, furthermore, appears to meet with the agreement of Herr and

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24. This should be understood in the sense that since the focus of study is the self, there are no other researchers involved in the inquiry. Furthermore, while the auto-researcher might interact with other people, they are not participants in the research.
25. In the meaning of 'second stage' transference, as defined in the section on 'Demonstrating Quality through the Representation' starting on page 79.

Anderson, who in the context of self-study notes that "one way to deal with bias is to acknowledge one's presence in the study and build in self-reflection" (2005, p. 35).

Outcome Validity in Self-study Reflective Practice

When outcome validity was considered in the context of insider action research, it was demonstrated that workability could be reinterpreted to be an issue of 'whether or not the action had the tangible impact on a real-world problem it was intended to have, in terms of learning, discussion, improvement or resolution, and provided the corresponding theory or knowledge'. The corresponding means for demonstration was to be found in the richness and quality of the representation, it was suggested, in combination with an adequate depth of reflection and a transparency in the construction of the representation itself. It was proposed that the guidance provided by Bullough and Pinnegar (2001), Moon (2004) and Feldman (2003), respectively, would be both useful and sufficient.

When it comes to self-study reflective practice, the purpose of this section is to examine whether the methods applicable to insider action research are directly applicable also in this context, or whether alternatives have to be put in place. For once, though, there does not appear to be any reason for such change in this case, no issues that are believed to invalidate any of the mentioned processes: Someone engaged in self-study reflective practice appears to be in a position where richness in the representation, transparency in the construction, and reflection about the process and the findings are not only reasonable, but crucial.

Augmentation may however be useful, at least in one respect, noting that the affinity between the need for transparency in self-study reflective practice and Anderson's (2006) requirement for a visible and active researcher in the text of autoethnography:

> "The researcher's own feelings and experiences are incorporated into the story and considered as vital data for understanding the social world being observed" (2006, p. 384).

I simply suggest that when it comes to transparency in self-study reflective practice, one should observe Anderson's advice as well, in the sense that getting an additional insight into the experience of the

researcher will help the understanding and appreciation of his construction.

Catalytic Validity in Self-study Reflective Practice

In their consideration of insider action research, Herr and Anderson (Herr & Anderson, 2005) advocate that the researcher as well as the participants must develop through the action. McNiff, Lomax and Whitehead concurs, and directly suggest that self-validation, among other criteria, depends on whether you can "offer an account of your own professional learning, and show that you influence has been educative for the people you are with" (2003, p. 136).

While the development of the researcher obviously is a relevant quality parameter in self-study reflective practice, the impact on 'the people you are with' may however not always be so: I suggest this is a choice point, the relevance depending on nature and purpose of the self-study.

First and foremost, reflective practice may well be done with the researcher as the only anchor point, McNiff, Lomax and Whitehead's (2003) 'people you are with' being either non-existent or of a transient nature, on which the study may only have the second-order impact, caused by the development of the researcher. Consider, for instance, a medical practitioner, striving to improve his handling of passing difficult messages to patients. As his empathy and skill grows in this respect, as a result of his past actions and reflection, the dialogue between patient and doctor improves, but the individual patient does only learn about his own situation, and not about the developing skill of the medical practitioner. Nor is he intended to; he is not a participant in research, but a potential benefactor of research. This patient belongs to what I would term a 'transient' group of 'people you are with'.

Even in cases where there is a more permanent group gathered round the auto-researcher, it is doubtful whether the developing effect on this group makes sense as a quality parameter in all situations. Of course, changing the behavior of the group might be the focus of the study, the means being discussion, knowledge-building and discourse. Under such circumstances, the professional development of the group is an obvious parameter to assess with respect to the quality of the study, but this would seem to be as much an assessment of outcome validity as of catalytic validity. In other cases, where the interaction between the researcher and 'the people you are with' is simply a component in the

practice being undertaken, an integral and natural part of the practice, it can be argued that a development or learning effect on the group is essentially contaminating the research, resulting in a sort of 'Stockholm Syndrome' which eventually is invalidating the findings of the reflective practice. This would seem to be true in particular in situations where the surrounding group by design is unaware of the research being undertaken, simply because their natural response to events is the fuel for the surprises that trigger reflection (Schön, 1983).

I suggest, thus, that in reflective practice the unavoidable quality issue with respect to catalytic validity is the one of the researcher demonstrating professional development, while the relevance and significance of assessing the development of 'the people you are with' needs to be considered in the light of the actual circumstances.

Demonstration of catalytic validity, in this light, becomes an issue of demonstrating the capability to learn, develop and reorientate, while the means for demonstration clearly are limited to such expressions that are capable of being included in the representation. Framed as such, it resembles the challenge the auto-scientist is facing when he, or she, has to demonstrate credibility and conveyability from the internal of the researcher to the external of 'everybody else': The reader must be allowed an insight into the researcher, as the latter struggles with learning and reflects on his changing understanding of her, or his, fieldwork. Without repeating the argument above, adequate depth of reflection (Moon, 2004) has the potential to provide learning and professional development, and adequate 'thickness' or richness of the representation (Bullough & Pinnegar, 2001; Geertz, 1983; Heikkinen, et al., 2007) seems capable of conveying the experiences of the reflecting and developing researcher in a sufficiently convincing fashion. I suggest that these criteria are applied in the demonstration of catalytic validity in self-study reflective practice.

Democratic Validity in Self-study Reflective Practice

As described above (see the section on 'Democratic Validity in Insider Action Research', see page 155), there are two somewhat similar definitions of democratic validity in insider action research.

First, it is noted that democratic validity is synonymous to local, or internal, validity (Herr & Anderson, 2005), which corresponds to the hermeneutic concept of credibility (Fishman, 1999; Lützhöft, et al., 2010). This however means that in the case of self-study, the arguments,

suggestions and conclusions valid for demonstrating credibility in autoethnography (see page 146 for a summary) also apply directly in self-study reflective practice.

Secondly, however, Herr and Anderson (2005, p. 56) also offer an alternative definition of democratic validity, as "the extent to which research is done in collaboration with all parties who have a stake in the problem under investigation", but adds that in the case of a non-collaborative study, the question is rather "how…multiple perspectives and material interests taken into account…" (Herr & Anderson, 2005, p. 56). Especially the latter is of importance when considering self-study, which well may be non-collaborative, a situation either being signified by the researcher being alone, by the researcher acting covertly, or by the researcher being surrounded by a transient mass of 'people you are with', as considered previously (see page 162).

Prior to a discussion of 'how…multiple perspectives are taken into account', it might however, as an initial question, be useful to discuss 'which multiple perspectives…'? As demonstrated above, the auto-researcher is subjective. Indeed, it is a merit, or even an imperative, that the auto-researcher acknowledges this stance (Winter, 2002) in his reflexive text. Combining his subjectivity with his loneliness, it can be argued that the only perspectives and interests the auto-scientist can include are the ones that somehow comes to his appreciation, by chance or by design, or even the subset of those he believes are important in the context being discussed. Since chance by nature is unpredictable, it is not useful to speculate about such an approach; useful insights and alternative perspectives from this direction can only be described as research serendipity. Design, however, could be a more promising way ahead; at least, this can be managed and described rationally.

Once again, this time through the consideration of how to design a process that may spawn a wider outlook and perspective, reflection may come to the rescue. Moon (2004, p. 97) offers guidelines for judging depth of reflection, and suggests that one of the defining characteristics of 'dialogic reflection' is the demonstration of the "recognition that different qualities of judgement and alternative explanations may exist for the same material" – or in other words, that multiple perspectives have been considered. Further towards the 'deep end' of the continuum of depth of reflection is 'critical reflection', which contains explicit discussion of the view of others versus the view of the writer, and an account that "probably recognizes that events exist in a historical or social context that may be influential on a person's reaction to them. In

other words, multiple perspectives are noted" (Moon, 2004, p. 216). In the present context, this may well be the solution, and rather than introducing a new parameter, this discussion merely serves to qualify the reflective level to more than a thoughtful mood during a walk in the park on a Sunday afternoon, which is insufficient in an academic representation (Moon, 2004).

Process Validity in Self-study Reflective Practice

Recalling the purpose of this section – discussing potential differences in quality concepts between insider action research and self-study reflective practice – there is little reason to believe that the difference in positionality should cause a change in the methodological rigor.

In brevity, the issues to fulfill are still those of reflection (Moon, 2004) to achieve true harmony between researcher and research, transparency in the choice and argument concerning methodology and method (Anderson, 2006; Feldman, 2003), satisfactory handling and explicitness of subjectivity (Winter, 2002), and compliance with the scientific traditions of the chosen method (Bullough & Pinnegar, 2001).

It is once again suggested that the need for discussing, in public, the methodology and choice of method, as is the norm in theses and dissertations, should be upheld in other scientific writings.

Summary: Reinterpretation of Quality Concepts in Self-study Reflective Practice

Quality Concept in Self-study Reflective Practice	*What a Researcher should do*	*How to accomplish this*
Dialogic Validity	Demonstrate awareness of subjectivity.	Depth of reflection (Moon, 2004).
Outcome Validity (Workability)	Demonstrate that the action had the tangible impact on a real-world problem it was intended to have (learning, discussion, improvement or resolution), and provided the corresponding theory or knowledge.	Hindsight through/analysis of rich and unfiltered documentation (Anderson, 2006; Bullough & Pinnegar, 2001; Feldman, 2003) and adequate reflection (Moon, 2004).
Catalytic Validity	Demonstrate that the action led to education/learning of the researcher herself/himself.	Adequate depth of reflection (Moon, 2004); rich and unfiltered representation (Anderson, 2006; Bullough & Pinnegar, 2001; Feldman, 2003).
Democratic Validity (Local Validity) (Credibility)	Demonstrate auto-researchers belief in the representation. Demonstrate consideration of multiple perspectives.	Complete Member Researcher (Adler & Adler, 1987), persistent observation, adequate depth of reflection (Moon, 2004).
Process Validity	Use a sound and appropriate research method.	Reflection (Moon, 2004), transparency (Anderson, 2006; Feldman, 2003), awareness of subjectivity (Winter, 2002), respecting practice (Bullough & Pinnegar, 2001).

Table 7 - Quality Considerations in Self-study Reflective Practice

Synthesis of Quality Concepts for Self-Study

Quality Concept in Self-study	*What a Researcher should do*	*How to accomplish this*
Credibility ***Democratic Validity*** ***Dialogical Validity*** ***(Local Validity)***	Demonstrate auto-researchers belief in the representation. Demonstrate consideration of multiple perspectives. Demonstrate awareness of subjectivity.	Complete Member Researcher (Adler & Adler, 1987), inward focus (Atkinson, et al., 2003) persistent observation, adequate depth of reflection (Moon, 2004).
Transferability ***(Conveyability)***	Provide a thick description	Rich and unfiltered representation according to Bullough & Pinnegar (2001) and Feldman (2003).
Dependability ***Process Validity***	Use a sound and appropriate research method. Enable tracking and reconstruction of research process	Careful documentation, research auditor, transparency according to Feldman (2003), visible researcher according to Anderson (2006), reflection (Moon, 2004), awareness of subjectivity (Winter, 2002), respecting practice (Bullough & Pinnegar, 2001).
Confirmability ***Outcome Validity*** ***(Workability)***	Show that inferences based on the data are logical and of high utility. Demonstrate tangible impact on a real-world problem (learning, discussion, improvement or resolution), provided the corresponding theory or knowledge.	Demonstrate workability according to (Heikkinen, et al., 2007), hindsight through/analysis of rich and unfiltered documentation (Bullough & Pinnegar, 2001; Feldman, 2003) and adequate reflection (Moon, 2004).
Catalytic Validity	Demonstrate that the action led to education/learning of the researcher herself/himself.	Adequate depth of reflection (Moon, 2004); rich and unfiltered representation (Bullough & Pinnegar, 2001; Feldman, 2003).

Table 8 – Synthesis of Quality Considerations in Self-study

Having established the above, a single question remains: Are the quality criteria from the two subforms of ethnography and action research, respectively, reconcilable?

As hinted at, and hopefully as elucidated through the discussion of the individual points, the differences in the considerations relating to validity between the schools of action research and ethnography are less significant than one could assume, when it comes to the borderline issues of self-study. Hence, it is possible to suggest a synthesis of the two, as per Table 8.

While, as shown in Table 8, there is a good meshing between the purposes and methods to achieve Credibility, Dependability and Confirmability (to use the terms from the autoethnographic sphere), two issues do not appear to have a correspondent in the other camp: the action research paradigm, as originally suggested by Herr and Anderson (2005), appears to miss a dimension corresponding to transferability, while the hermeneutic paradigm, originating with Lincoln and Guba (1985), Fishman (1999) and Lützhöft (Lützhöft, 2004; Lützhöft, et al., 2010), appears to miss a concept matching catalytic validity.

DISCUSSION: SCOPE, METHODOLOGY, VALIDITY AND RELIABILITY

Discussion: Limitation of Scope

The approach used in this thesis imposes limitations, considering the very heavy resource demand each real-life UCD application cycle demands: This prohibits a large, systematic investigation of this nature. In turn, it also causes a methodological reflection: A single trial, or a small number of trials, may provide certain learning, and may have internal validity in the traditional sense. They may, or may not, furthermore, have the potential for external validity, or transferability, in spite of being developed by a qualitative method (Polkinghorne, 2003a), but I suggest that the present case, where only a single voice is heard in the narratives, precludes the analysis and argument that is demanded by (analytical) ethnography as such to achieve transferability (Anderson, 2006; Fishman, 1999; Polkinghorne, 2003a).

Since, however, the demonstration of internal validity is the goal of the research undertaken, this is of little immediate consequence: The imposed limitation is very conscious, and accepted in acknowledgement of the very substantial amount of work required to hear other voices, and to undertake the subsequent analysis of meaning: this ambitious undertaking is considered to be the subject of further work, planned, but however not a part of this thesis.

Discussion: Researcher Identity and Research Practice

A philosophic twist relating to practice, and hence to Reflective Practice, needs to be touched upon: Practice is, by definition, limited in breadth by the scope of the science, or profession, practiced. In other words, reflective practice does not work across epistemologies, and I suggest it does not extrapolate into other domains.

Schön describes this phenomenon by noting that practitioners brings 'constants' to their reflection-in-action, and continues to elaborate that the constants includes "the appreciative systems they [the practitioners] bring to problem setting, to the evaluation of inquiry, and to reflective conversation", as well as "the overarching theories by which they make sense of phenomena" (1983, p. 270). Elaborating,

Schön advocates that practitioners are constrained, or even bound, by their practice, and that their primary force, which is the capability to reflect-in-action based on the ballast provided by the "constants", is at the same time a limiting factor of reflective practice: It prohibits excursion beyond the sphere of the constants. It should be noted that Schön (1983) does not use the word "constant" as in a mathematical constant, but rather something that can and does change over time, however slowly: Practitioners do change, sometimes in response to reflection, but at a slower rate than they build theory within their own domain.

In the present case, both points – the issue of constants and the capability to change them – are important: One could well argue that I would be unable to be a reflective practitioner in the context of user centered design and human factors engineering, since it is beyond my engineering background, or, to remain within terminology, my engineering constant. This is however where my past experience plays a perhaps very important role: Through the pilot studies undertaken previously, and my long-time flirt with human factors, I have acquired a sufficient skill-base to qualify as a (novice) practitioner: Clearly not letter-perfect, as evidenced by this thesis, but nevertheless in a position to reflect-in-action. In combination with learning – change over time in response to reflection, as Schön (1983) mentions – I propose that my professional span is adequate for the work.

I am, in this light, a reflexive practitioner. I have the insider positionality that is an inherent part of reflective practice, and I have been driven by observation, puzzlement and surprise towards reflection, attempting to make sense of what I encountered (Schön, 1983) – with the purpose of causing change and of building knowledge that could be useful for other applicants of UCD.

Admittedly, reflective practice also suits me well from a value perspective: It is apolitical, and not associated with specific value-laden agendas. In my choice of reflective practice, I am also recognizing my dual positionality: I am a practitioner, but I am also a student. The influence of the latter should not be overseen, and nor should the importance: It is, to an extent, the demands of study that is forcing reflection upon me, and which is changing me to *become* a reflective researcher, defined as an "activity of practitioners" (Schön, 1983, p. 308). Had I not had study as an additional assignment, I doubt I would have learned as I believe I have.

It is not that these two positionalities are always to be kept apart. There is always a tension between them (Bullough & Pinnegar,

2001), considering that I am only one person, with one mind. On every count, where I felt the conflict between the two, I have consciously opted for the practitioner side of me to prevail, and not let the student run out of control, or resume responsibility for actions of project relevance – not necessarily out of virtue, believing that this eventually would result in the best field data possible, but out of professionalism and dedication to my 'real' position. I nevertheless find that this is the appropriate balance also from a study point of view: The data gathered should be as close as reasonably possible to what another project manager would observe, or encounter, in his or her undertaking of a similar venture. The student has nevertheless been sitting on my shoulder throughout, leading me on a voyage to places "no less strange to me at first than those of the Amazon forests", as Murphy (1990, p. xi) dramatically phrase it– in my case into the realm of academia. What I have found there is the tools to make meaning of what I do (and indeed: did), what I see around me, and what I experience – and I find that with that newly-gained knowledge, I have to reiterate the importance of the study assignment itself, which to me is a strong driver to continue my work, for the sake of research – and to continue my research, for the sake of my work. Not only have I *become* a reflexive practitioner – I have come to depend on being one, to optimally have a foot in each of the camps of practice and academia.

In the beginning of the chapter on 'Methodology' (see page 111), I asked 'What did I really do?', and proceeded to develop the methodological framework for the fieldwork undertaken. On that basis, it is easier to give an answer than before, albeit neither a final one, nor a complete one: The research is ongoing, and so is the development of the researcher. Hence, nothing but a snapshot is possible, but on the background of the argument contained in the methodology section of this thesis, I suggest that I did apply a scientific method; I did do science.

In the tradition of Schön (1983), I have allowed myself to experience surprise, puzzlement and confusion in the unique situations Projects Alpha, Beta and Gamma provided, and I have reflected on the phenomena before me. Through my actions as a practitioner, I have generated change and new understanding of those situations and phenomena. I have reflected-in-action, and hence, I have become a researcher in the practice context. In this, I have followed a path beaten by an "increasing number of higher degree students, especially part-time candidates, who what to combine work and study be researching their professional practices" by using action research (Zuber-Skerrit &

Fletcher, 2007, p. 413), recalling that reflective practice is a subform of this science (Herr & Anderson, 2005).

I have utilized the four potential advantages of the insider position I do have, as discussed (and later refuted) by Hammersley (1992), and I also suggest that the observation time in the field qualifies as 'prolonged', at least as far as Project Alpha is concerned, which fulfills the usual requirement in ethnography (Fishman, 1999; Hammersley, 1992; Hammersley & Atkinson, 2007; Lützhöft, 2004).

In the footprints of Anderson (2006), I have done analytical autoethnography in the sense that I consider myself to be a Complete Member Researcher, as this positionality is described by Adler and Adler (1987). I am furthermore exhibiting analytical reflexivity, considering that the interaction between the researcher and the world being researched is both present and grounded in reflection. Furthermore, I am a visible and active researcher in the tales and narratives provided in this thesis, and I am committed to an analytic agenda, which I hope stands out clearly from the discussion in the present chapter – while it may not be demonstrably so before transferability of knowledge is sought or claimed.

I am however not, as yet, having an earnest dialogue with the relevant informants beyond the self. As argued above, I see this as a temporal issue, or another limitation of the scope of this thesis, rather than a flaw in the undertaking, or, indeed, a lack of commitment to the agenda of analytical autoethnography. Furthermore, considering that I am not claiming transferability (conveyability) of the knowledge I suggest to have been generated at this stage, the lack of such dialogue is in itself neither a scientifically problematic issue, nor one that does subtract from the work done: It is, as stated, more of a pathway to the future.

Curiously, I believe that I in this respect am also honoring Habermas' (1971) belief that knowledge and interest are inseparable, and, in my interpretation, that knowledge thus is context specific, and depends not only on the situation in which observations were made, but also on the observer, his or her interests, and how she or he is a product of their background. This line of thinking appears to be relevant to transference, and it further appears that Habermas' observation that "the discipline of trained thought thus correctly aims at excluding such interests" (1971, p. 316) might be a key concept in transference, which well could encompass a transition from a more interested to a less interested knowledge stage, or a move towards reduced subjectivity.

Finally, and much depending on conviction and taste, taking the stated deficiencies towards transferability (applicability) into account, I might even technically qualify as an evocative autoethnographer.

The importance of these suggestions are in the realms of validity and reliability: Together with the arguments presented, they both begin and conclude the discussion of the appropriateness of the methodology applied, finding as they do that a scientific method was employed to capture the field data reported in this thesis.

Discussion: Validity and Reliability

The section above establishes that my method is consistent with action research and ethnography, in the subforms of Reflective Practice and Analytical Autoethnography. In turn, this justifies the selection of validity and reliability criteria and considerations appropriate to these two science forms, which eventually leads to a point where Silverman's challenge can be addressed: "… unless you can show you audience the procedures you need to ensure that your methods were reliable and your conclusions valid, there is little point in aiming to conclude a research dissertation" (Silverman, 2005, p. 209).

There is no black or white answer to Silverman, typical of the subjective nature of qualitative research. In some cases, I would even go as far as stating that there is no answer at all: While the criteria of validity are reasonably well established, as outlined in the chapter on 'Validity and Reliability'(see page 131), the practical application of the same criteria is a voyage in uncharted waters: How do you 'show the audience', as Silverman requires, in the actual case?

It is my suggestion that as the researcher you do not: the audience has to 'show' this to itself. In the broadest of terms, the researcher can present the data to be judged, and the corresponding methodological argument regarding validity and reliability, but whether this eventually is convincing is an individual and thus subjective decision.

In the present context, the data has been presented, and so has the instruments for judging their validity. Thus, it is time for the 'audience' to do the 'showing': my cards are indeed on the table.

Concluding this discussion with a final suggestion in way of guidance, I propose that each reader initially needs to judge whether this thesis is of sufficient academic quality. Does it, as Zuber-Skerrit and Fletcher (2007) recommend, sufficiently well define the research

question, investigate a significant problem, justify the methodology, advance theory and practice, and communicate clearly and logically? Does it point to limitations, and future research to be done? If it does not, I must strengthen my reporting.

Each reader further needs to judge for herself, or himself, whether the quality concepts and criteria developed for the assessment of self-study are reasonable, well grounded and useful, or whether they are inadequate in way of establishing an applicable quality norm. If they are, I need to improve my argument.

In continuance, each reader needs to judge for himself whether the representation lives up to these quality criteria, and hence is rich enough, 'thick' enough, convincing enough, credible enough and transparent enough to provide an adequate basis for judgement. Each reader furthermore needs to assess whether the reflection on display is deep enough, and whether the subjectivity of my position has been handled in an appropriate manner. If it is not so, I have to enhance my narrative.

In conclusion, each reader finally needs to judge for himself whether my behavior and undertakings in the field, my positionality, and the outcome of that work, when measured against the quality criteria, constitutes science and has yielded a valid and reliable knowledge claim. If it does not, I have to reiterate in my research.

If, in the final event, this judgemental process appears too cumbersome, each reader could alternatively revert to Reason and Marshall (2006), who defines good research in a simpler way, and ask herself, or himself, of whether I 'pass' muster by expressing the fundamental attitude of a good researcher:

> "In our view, good research is an expression of the need to learn and change, to shift some aspect of oneself" (P Reason & Marshall, 2006, p. 317)

As they say in the card-playing world: Your call.

FUTURE WORK

"We believe that any official version of a process must continuously be updated to reflect actual development practices, or it will soon become obsolete, and likely to be ignored and abandoned"

(Gulliksen, et al., 2006, p. 585)

The foregoing chapters answer to the research question formulated in the beginning of this thesis:

> 'Is the application of UCD according to ISO 9241-210 (1998) effective, efficient, satisfactory and easy to learn for those responsible for managing hardware and software design and redesign processes?'

albeit with local validity only. Together with the analysis reported in this thesis, the fieldwork undertaken suggests an answer to the research question that is short of positive, in the sense that that the usability of user centered design, as this is described by ISO 9241-210 (2009), leaves room for improvement in the specified context of use.

In greater detail, while the user centered methodology as a process appears to be effective, and provide a the necessary groundwork for the design of systems with improved usability, it is found that the learnability and user satisfaction of applying the method scores low on a quality-in-use scale, when regarded from the perspective of the manager leading software.

An often-recurring observation in this thesis however pivots round the local validity of the findings: The hermeneutical equivalent of generalization – transferability – has not been addressed in the work done, by design, and in acknowledgement of the singular voice speaking throughout the thesis.

Transferability of the Present Results

Yet, the ultimate purpose of the exercise is to answer the research question in a more general sense, and on a broader base than

allowed by the research carried out so far. I suggest this can be achieved through a number of different approaches, which include

- Validating the conveyability of the present tales by including the views and observations of the members of the Project Teams involved in the present study;
- Seeking applicability by hearing other voices of other tribesmen – other usability project managers – either directly or indirectly (through literature);

These points partly concern adding further richness, or thickness, to the present data, which currently are confined to the views, understandings and insights of somebody being 'responsible for managing hardware and software design and redesign processes', and partly to ground them in literature, for the purpose of demonstrating transferability.

Alternative Methods

Other approaches may also well provide an improved understanding of the usability of user centered design methods. According to Pew and Mavor (2007), three different approaches appear to be directly relevant in the present case, as potential avenues to investigate the usability of user centered design methods:

1. "Evaluation of the user's performance and satisfaction when using the product or system in a real or simulated working environment. Also called evaluation of "quality in use" or "human in the loop."
2. Evaluation of the characteristics of the interactive system, tasks, users, and the working environment to identify any obstacles to usability.
3. Evaluation of the process used for systems development to assess whether appropriate HSI[26] methods and techniques were used…" (2007, p. 265)

In the above list, the first point matches what is described in the section above: evaluating the user's performance and satisfaction when

26. HSI is an abbreviation of Human-System Integration.

using the 'product', which in this case means the process described in ISO 9241-210 (2009). However, I suggest that the research question also may be answered, in full or in part, by applying the alternative methods. At least, it seems likely that the findings of the latter two approaches may provide additional validity to the results provided by the first method.

Starting in reverse order, the third 'method' described by Pew and Mavor (2007) implies an inquiry into the work that originally went into the description of user centered design, and how the people who did it went about the necessary considerations of context-of-use, user involvement, the design of the process, the validation of the design solution and the corresponding acceptance criteria and other pertinent topics. Given that data towards this end can be obtained, this method appears to offer some potential towards answering the research question.

Further along this line of thinking, the second 'method' of Pew and Mavor (2007) also holds a certain promise, considering the findings of the field study undertaken and reported presently. As such, I suggest that there would be a significant benefit associated with hearing the voices of other typical roles participating in user centered design, apart from the one already documented in this thesis.

It is as such my current suggestion that a much improved understanding of engineering practice, engineering practitioners and the maintenance of the engineering knowledge base is required to increase the satisfaction of doing user centered design. This includes gaining further and deeper insights into the mechanisms of achieving buy-in and cross-professional respect, of understanding tradition, resistance against change and the associated organizational and individual mechanisms.

The work of Gulliksen, Boivie and Göransson (2006) on the perspective of the UD – the Usability Designer – is another example of a role in the multidisciplinary team that needs to be appreciated, in order to gain a wider understanding of the team dynamics. It is conceivable that a further devotion to this could also provide advice on necessary changes of the human factors practice, noting that human factors practitioners depends on others to transform knowledge into practical results: Human factors as a science does not have the executive arm that medicine and dentistry, as examples, does, but typically depends on engineering practice to reach such results (Gulliksen, et al., 2006).

Central to any team is the team leader, and the multidisciplinary design team doing user centered design is unremarkable in this sense:

the team leader is indeed central. Hoping not to appear narcissistic, what is however remarkable in this context is what appears to be an almost unreasonable demand to the skills, crafts, leadership qualities, social and professional understandings and personal characteristics like patience, determination and stamina in UCD team leaders. In agreement, Gulliksen, Boivie and Göransson notes that "Moreover, usability professionals need…a great deal of stamina and backbone" (2006, p. 584). To use a popular metaphor, the usability team leader must be a lamb with five legs, and the point here is that this might be an Achilles heel of user centered design in an industrial context: How many of those are around, and from where do we get a fresh supply?

As Gulliksen, Boivie and Göransson (2006) suggests, there is an educational challenge in this as far as academia and the universities are concerned, but as they do (Gulliksen, et al., 2006), I believe that this is insufficient: such team leaders need the seasoning of practice, and hence, they need to survive in an industrial environment for long enough to earn the required respect and experience. This, I suggest, places an obligation on the industrial community as well, something which however needs significant research and dialogue to mature.

Stepping a step back in a sort of wrapping up of this subject, I suggest that the gathering, analysis and improved understanding of the functions and roles of the multidisciplinary team members will help assessing the width and depth of something which, based on the present data, appears to be an epistemological gap between the team members, hindering the effectiveness of the work to be performed.

Communicating User Centered Design

In the context of the UD, the Usability Designer, Gulliksen, Boivie and Göransson (2006) keeps focusing on the communicative skills required.

> "Communication skills are essential for the UD, given that one of the main tasks it to act as a communication channel between the users and the system developers" (Gulliksen, et al., 2006, p. 582)

and continue that

> "Communication is a key factor for effective multidisciplinary teamwork and the ability to establish a common understanding

> of the design problems and common ground" (Gulliksen, et al., 2006, p. 594)

Finding myself in complete concurrence, I would however like to augment this point, with a mindset towards future work: The findings of this thesis quite clearly identify that team members of a solution oriented practice are rather disinterested in communication of a theoretical nature. Yet, I suggest, transferring such know-how to all team members, and perhaps even to all stakeholders is important, or indeed essential. Finding ways and means to do so effectively, without alienating this audience, is a topic that warrants careful consideration and research.

An Update of User Centered Design Methodology

Achieving transferability (in both of the reinterpreted senses) of the present findings is however not the terminal, but only a station on the line, a prerequisite for the utility of the knowledge generated: The eventual purpose of the research undertaken is to make a contribution to the increased application of user centered design, in the maritime industry as well as in a larger context, to the benefit of effectiveness, efficiency and user satisfaction.

From the scope statement of ISO 9241-210 (2009), the level of ambition of the standard is clear.

> "The information in this part of ISO 9241 is intended for use by those responsible for planning and managing projects that design and develop interactive systems. It therefore addresses technical human factors and ergonomics issues only to the extent necessary to allow such individuals to understand their relevance and importance in the design process as a whole. It also provides a framework for human factors and usability professionals involved in human-centred design" (ISO9241-210, 2009, p. 1)

Let it be clear that I find that the standard achieves what it sets out to do. Sometimes, however, it is not enough to look at what is there – it is just as important to look at what is not. In the context of the research question, this translates into what I have chosen to label 'adequacy': Are the available descriptions of user centered design, as

expressed for instance in ISO 9241-210 (2009), adequate in terms of preparing you, the coming usability manager, for the task at hand?

Reading this, you might with some right wonder why I venture into this dimension, but I assure you it is not done on a whim: I suggest that in order to be successful, eventually, in user centered design, or indeed in any other undertaking, being prepared is invaluable – but you obviously need to prepare for the right things.

This preparedness, I further suggest, might in the present case best be achieved by using the knowledge gained from present and future research to suggest augments to the available descriptions of user centered design, of which ISO 9241-210 (2009) might be taken as an example, or to the corresponding literature: It could appear that the potential users of user centered design methods could benefit from a wider, more holistic, description of the art and craft of user centered design, the skills needed, and the pitfalls to be observed.

Future work on Methodology, Validity and Reliability

As discussed above, establishing the transferability of the present results is an important next step in the work towards answering the research question, and ultimately towards better understanding of the potential barriers to a more widespread usage of user centered design in the maritime industry.

While the concept of transferability appears to be rather widely argued (Fishman, 1999; Lincoln & Guba, 1985; Polkinghorne, 2003a), the perspective seems to be a bit different in Action Research. Here, the demands and conditions needed to generalize findings appear to be less developed than in ethnography. However, Fals Borda (2001) mentions generalization in the context of participatory action research, and Greenwood and Levin subscribe to a Webrarian notion of "Transcontextual Credibility", which appears to match the concept of transference:

> "Meanings created in one context are examined for their credibility in another situation through a conscious reflection on similarities and differences between contextual features and historical factors. They are moved from the context where the understanding was created through a collaborative analysis of the situation where this knowledge might be applied. Based on the historical and contextual analysis, AR judgements are

> made about the possibility of applying knowledge from one situation in another" (1998, pp. 84-85).

From a theoretical viewpoint, however, I propose that the above argument on transferability might only be the tip of the iceberg, and that further, deeper analysis is required to examine transferability at the interface of autoethnography and self-study reflective practice. In particular, the issues of researcher positionality and of the transition from conveyance to applicability might have side effects that should be examined.

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CONCLUSION

Summary

The present study concerns itself with the usability of the user centered design methodology, as this is defined by ISO 9241-210 (ISO9241-210, 2009) and other international standards:

> "[usability is the] extent to which a product can be used by specified users to achieve specified goals with *effectiveness*, *efficiency* and *satisfaction* in a specified context of use" (authors emphasis) (ISO9241-11, 1998; ISO9241-210, 2009, p. 3; ISO13407, 1999, p. 1),

From the outset of the study, it is speculated that low usability could be a barrier towards the limited application user centered design appears to have within the maritime industry, and the research question posed is correspondingly formulated as

> 'Is the application of UCD according to ISO 9241-210 effective, efficient, satisfactory and easy to learn for those responsible for managing hardware and software design and redesign processes?'

Before turning to the answer to that, let it be made perfectly clear that I neither find flaws in the process described in ISO 9241-210 (2009), nor in the general advice it contains. The issue here is not an overt, or even covert, criticism of the huge and important work this standard represents, but a question directed towards the process the standard describes and explains in a sound and competent manner: Is that process effective, efficient, easy to learn and satisfactory to apply, for those who have to do so, under the conditions under which the work has to be done?

I have sought the answer to the research question by way of practice, and have undertaken three user centered design projects, in a fully industrial context, in what I believe to be accordance to ISO 9241-210 (2009), as far as practically possible.

During the execution of these three projects, I have used the scientific principles of Reflective Practice (Schön, 1983), augmented with the budding tradition of Analytic Autoethnography (Anderson, 2006), to collect data, the subject being 'those responsible for

managing…software design' – myself, and my actions. Throughout that period, which lasted two years, I have kept a research diary, and from the more than 85.000 words, illustrations, files, presentations and other evidence, I have constructed six tales of the field, in the narrative tradition primarily described by van Maanen (1988), Stringer (2007), Anderson (2006) and Schön (1983), adding up to what I suggest contains the 'thickness' described by Geertz (1983).

With regard to validity and reliability, I have developed the appropriate concepts from Action Research (Herr & Anderson, 2005) and Ethnography (Fishman, 1999; Hammersley, 1992; Lincoln & Guba, 1985; Lützhöft, et al., 2010) to a level where I suggest they cover self-study. The thinking of Anderson (2006), Feldman (Feldman, 2003, 2007), Moon (2004), Bullough and Pinnegar (2001) and Winter (2002) have been instrumental in this process, which culminates in a synthesis of validity and quality criteria that I suggest are applied to my own work – an application, however, I suggest is undertaken by the reader of this thesis, due to its fundamentally subjective nature.

Throughout the thesis it is stressed that the findings are believed to have local validity, but local validity only: they are not readily transferable, or if they are, the argument has neither been attempted nor presented.

Results

The research undertaken shows, within this local context where it is valid, that the user centered method as described by for instance ISO 9241-210 (2009) is effective, and describes a process which leads to improved usability.

It however also shows that the learnability of the user centered design method leaves something to be desired, and furthermore, that the satisfaction of doing user centered design, seen from the perspective of 'those responsible for managing hardware and software design and redesign processes', is lower than one could hope for.

It appears that four issues are underrated in the current descriptions of user centered design:

- The determination required;
- The importance of achieving buy-in amongst all stakeholders;
- The establishment of the faith in the iterative process of usability;

- The quest for consensus.

From a holistic vantage point, I am suggesting that the root cause in broad terms may be that the user centered design process is not entirely aware of its own context-of-use in a complex, industrial environment. I suggest that a more comprehensive understanding of the intricate interactions and influences of performing user centered design in such a context might be desirable, and could lead to a useful supplement of the knowledge presented by, among other, ISO 9241-210 (2009).

Change

Primary among the areas that appear to be important, when it comes to augment the understanding of user centered design, comes the issue of change: To me it appears that the user centered design process does not recognize itself as an organizational change process, and perhaps in that fashion is insufficient. This view, I advocate, is widely supported in the tales of the three projects recounted in this thesis, and their substantial and often recurring references to members of the multidisciplinary design teams who do their utmost to resist the change process I suggest UCD brings to an organization.

In my understanding, most of these reactions and patterns of behavior can potentially be traced back to be responses to (undesired) change, I advocate that the standard, and probably also the literature on user centered design, is extended to cover this issue, theoretically and from a practical perspective.

Neglecting to do so might have negative consequences on budding usability initiatives, who are deterred by, or simply too embryonic to withstand, the first wave of resistance, and hence wither and die.

Multidisciplinary Team

Concluding on potential additions to the description of the user centered design process, and maybe to the usability literature at large, I may well have kept the most important issue as the last: In my view, neither appears to fully appreciate the imperative importance of the creation and jelling of the multidisciplinary team, and nor, perhaps, the contentions that appear to be an unavoidable part of the baggage. The

challenge of forming the multidisciplinary team is a challenge that begins when you contact the first member of your multidisciplinary team, and one that perhaps never ends, or perhaps finds a natural resting place, in some sort of pragmatic, demilitarized fashion.

It is a challenge that is removed from the challenge of resistance to change, but it is however also a challenge that unequivocally must be handled and solved: You will do no user centered design without a multidisciplinary team. Hence, it is my best recommendation that unless you already have, or are prepared to invest, in the creation of a multi-skilled, multi-talented and fully functioning team in terms of time and other resources, you should not consider venturing into user centered design. As I have come to see it, the significant effort required to assemble the multidisciplinary team is both a major strength and a grave weakness of UCD: once the team is accomplished, it provides you with the impressing and powerful views, tools and combined skills set you need to undertake user centered design, and to put better products into your market. Without it, you do not even start.

As if this was not warning enough, I would like to offer the following caution: team building in the context of UCD appears to be even more complicated than in other cases I have experienced. My working hypothesis is that the rather extreme difference in the philosophy and epistemology of team members, in my case ranging from university professors and PhD's to nuts-and-bolts engineers, and their different temperaments, from the solution-oriented to the theoretical, is an additional hurdle to overcome. The Players in your team may have different motives, which you need to take account of as the leader of the team. Consider, furthermore, that in many cases, your end-user representatives may be even further removed from the managers, sales-persons and other stakeholders you also need to include, than they were in my case, and you will have an idea about the multi-faceted challenge you are up against. In my view, there is nevertheless no way around this challenge: Imagining that you can design something for someone while you sit comfortably at your desk, without intimate and prolonged contact with the environment for which you are designing, appears to me to be not of this world.

Winding Down

Achieving the final breakthrough for user centered design in the maritime industry is obviously not something that is done overnight and just as obviously nothing that will happen by itself.

Continued research is required, rather extensively, it seems, and the pooling of resources, know-how, engagement and willpower is in my view prerequisites for success: No one-man band can fix this problem.

Achieving buy-in, as has been one of the recurring themes of this thesis, is needed, but not only at the level of the individual multidisciplinary teams, or their members, but at the level of the entire maritime industry. Education, training and communication become the focal points, and it is my suggestion that the future of maritime usability lies in the continued, and increased, usage of usability champions, spokespersons and ambassadors. It is a suggestion I share with Gulliksen, Boivie and Göransson (Gulliksen, et al., 2006), who notes that

> "usability requires efforts and support on a strategic level in terms of individuals within the organization who act as usability champions or 'sponsors', providing leadership, resources and coordination" (2006, p. 592).

I, however, suggest that this insight applies across the entire maritime industry, and not is limited within individual organizations. Considering one of the more prominent outcomes of the work done in the present thesis, I finally suggest that such usability lighthouses consider the solution-oriented nature of their preferred audience, when usability campaigns are planned:

Heuristic: Do not lecture. Shut up, and 'engineer'

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REFERENCES

Adler, P. A., & Adler, P. (1987). *Membership Roles in Field Research* (Vol. 6). Newbury Park: Sage Publications.

Anderson, L. (2006). Analytic Autoethnography. *Journal of Contemporary Ethnography, 35*(4).

Argyris, C., Putnam, R., & Smith, D. M. (1985). *Action Science*. San Fransisco, CA, USA: Jossey-Bass Inc.

Atkinson, P., Coffey, A., & Delamont, S. (2003). *Key Themes in Qualitative Research - Continuities and Change*. Walnut Creek: AltaMira Press.

ATOMOS. (1998). *Conceptual Standard for SCC Design (including HMI)*. London: http://www.he-alert.org/documents/published/he00450.pdf.

ATOMOSii. (1999, 12 14). *CORDIS*, from http://cordis.europa.eu/transport/src/atomosii.htm

Bader, G., & Nyce, J. M. (1998). When Only the Self is Real: Theory and Practice in the Development Community. *Journal of Computer Documentation, 22*(1), 5-10.

Bargal, D., Gold, M., & Lewin, M. (1992). The Heritage of Kurt Lewin: Theory, Research and Practice. *Journal of Social Issues, 48*(2).

Bella, D. A. (1987). Engineering and Erosion of Trust. *Journal of Professional Issues in Engineering, 113*(2), 117-129.

Bochner, A. P., & Ellis, C. (Eds.). (2002). *Ethnographically Speaking - Authethnography, Literature and Aesthetics*. Walnut Creek: AltaMira Press.

Boehm, B. W. (1988). A spiral model of software development and enhancement. *IEEE*, 61-72.

Borda, O. F. (2001). Participartory (Action) Research in Social Theory: Origins and Challenges. In P. Reason & H. Bradbury (Eds.), *Handbook of Action Research* (Concise Paperback Edition ed.). London, UK: Sage Publications.

Bowker, G. C. (1998). A Room With a View. *Journal of Computer Documentation, 22*(1).

BSH. (2009). *Grounding of the LT CORTESIA on 2 January 2008 on the Varne Bank in the English Channel*.

Bullough, R. V., & Pinnegar, S. (2001). Guidelines for Quality in Autobiographical Forms of Self-Study Research. *Educational Researcher, 30*(3), 13-21.

Carr, W., & Kemmis, S. (1986). *Becoming Critical - Education, Knowledge and Action Research*. Abingdon, Oxon, UK: Deakin University Press.

Coghlan, D., & Brannick, T. (2005). *Doing Action Research in Your Own Organization* (Second ed.). London: Sage Publications Ltd.

Consortium, T. A. (1998). *Conceptual Standard for SCC Design (including HMI)*. London: http://www.he-alert.org/documents/published/he00450.pdf.

Cook, T. D., & Campbell, D. T. (1979). *Quasi-experimentation: Design and Analysis Issues for Field Settings*. Boston: Houghton Mifflin Company.

DeMarco, T. (1997). *The Deadline*. New York, NY, USA: Dorset House Publishing.
DeMarco, T., & Lister, T. (1999). *Peopleware - Productive Projects and Teams*. New York, NY, USA: Dorset House Publishing Co.
Dillon, A. (1998). Cultural Analysis and What Designers Need to Know - A Case of Sometimes Too Much, Sometimes Too Little, and Always Too Late. *Journal of Computer Documentation, 22*(1).
Ellis, C., & Bochner, A. P. (2003). Autoethnography, Personal Narrative, Reflexivity: Researcher as Subject. In N. K. Denzin & Y. S. Lincoln (Eds.), *Collecting and interpreting qualitative materials*. Thousand Oaks, CA, USA: Sage.
Feldman, A. (2003). Validity and Quality in Self-Study. *Educational Researcher, 32*(3), 26-28.
Feldman, A. (2007). Validity and quality in action research. *Educational Action Research, 15*(1), 21-32.
Fetterman, D. M. (1998). *Ethnography: Step by Step* (2nd ed.). London: Sage Publications.
Fishman, D. B. (1999). *The Case for Pragmatic Psychology*. New York, NY, USA.: New York Univeristy Press.
Forsythe, D. E. (1999). "It's Just a Matter of Common Sense": Ethnography as Invisible Work. *Computer Supported Cooperative Work, 8*(1-2), 127-145.
Gamow, G., & Stannard, R. (1999). *The NEW World of Mr. Tompkins*. New York, NY, USA: Cambridge University Press.
Geertz, C. (1983). *Local Knowledge - Further Essays in Interpretive Anthropology* (2000 ed.): Basic Books.
Gibbons, M. (1997). What Kind of University? - Research and Teaching in the 21st Century - 1997 Beanland Lecture, Victoria University of Technology. Retrieved from www.griffith.edu.au/vc/ate/pdf/gibbons.pdf
Giddens, A. (1979). *Central Problems in Social Theory: Action, Structure and Contradiction in Social Analysis*. Berkelye and Los Angeles: University of California Press.
Goodnough, K. (2008). Dealing with Messiness and Uncertainty in Practitioner Research: The Nature of Participatory Action Research. *Canadian Journal of Education, 31*(2), 431-458.
Graham, D. (1992). The Forgotten Phase. *Dr. Dobb's*.
Greenwood, D. J., & Levin, M. (1998). *Introduction to Action Research - Social Research for Social Change*. Thousand Oaks: Sage Publications.
Gulliksen, J., Boivie, I., & Göransson, B. (2006). Usability professionals - current practices and future development. *Interacting with Computers, 18*, 568-600.
Habermas, J. (1971). Knowledge and Human Interests: A General Perspective. In G. Gutting (Ed.), *Continental Philosophy in Science* (pp. 310-321). Malden, MA, USA: Blackwell Publishing.
Hammersley, M. (1992). *What's wrong with ETHNOGRAPHY?* Milton Park, Abingdon, Oxon, UK: Routledge.

Hammersley, M., & Atkinson, P. (2007). *Ethnography* (Third Edition ed.). London: Routledge (Taylor & Francis Group).
Heikkinen, H. L., Huttunen, R., & Syrjälä, L. (2007). Action research as narrative: five principles for validation. *Educational Action Research, 15*(1), 5-19.
Herr, K. (1999). Unearthing the Unspeakable: When Teacher Research and Political Agendas Collide. *Language Arts, 77*(1), 10-15.
Herr, K., & Anderson, G. L. (2005). *The Action Research Dissertation - A guide for Students and Faculty*. Thousand Oaks, CA, USA: Sage Publications, Inc.
IABG. (1992). from www.v-modell.iabg.de/kurzb/vm/k_vm_e.doc
ISO9241-11. (1998). Ergonomic requirements for office work with visual display terminals (VDTs) -- Part 11: Guidance on usability. Geneva: ISO.
ISO9241-210. (2009). ISO 9241-210: Ergonomics of human-system interaction - Part 210: Human-centred design for interactive systems (Vol. ISO 9241-210): ISO.
ISO13407. (1999). ISO/IEC 13407 - Human-centred design processes for interactive systems. Geneva: ISO.
Karlsson, I. C. M. (2000). *A holistic approach to usability*. Paper presented at the 2000 Nordiska Ergonomisälskapet.
Kerr, E. T. (2008, 2008-12-02). Engineering Archetypes. Retrieved 10-01, 2009, from http://edinburghepistemology.wordpress.com/2008/12/02/engineering-archetypes/
Kirk, J., & Miller, M. L. (1986). *Reliability and Validity in Qualitative Research*. Newbury Park, CA, USA: Sage Publications.
Koen, B. V. (1985). *Definition of the Engineering Method*: American Society for Engineering Educations, Washington, D.C.
Koen, B. V. (2003). *Discussion of THE Method - Conducting the Engineer's Approach to Problem solving*. New York: Oxford University Press.
Krug, S. (2006). *Don't Make Me Think! A Common Sense Approach to Web Usability, Second Edition*. Berkeley, CA, USA: New Riders.
Lewin, K. (1946). Action Research and Minority Problems *Resolving Social Conflicts & Field Theory in Social Sciences*. Washington: American Pyschological Associaton.
Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic Inquiry*. Newbury Park, CA, USA: Sage Publications.
Lyons, J. (1999). Reflective education for professional practice: Discovering knowledge from experience. *Nurse Education Today, 19*(1), 29-34.
Lützhöft, M. (2004). *The Technology is Great When it Works.* Linköping.
Lützhöft, M., & Dekker, S. (2002). On Your Watch: Automation on the Bridge. *The Journal of navigation, 55*, 83-96.
Lützhöft, M., & Lundh, M. (2009). Maritime Application of Control Systems. In T. Ivergård & B. Hunt (Eds.), *Handbook of Control Room Design and Ergonomics, A perspective for the future, Second Edition*. Boca Raton, FL, USA: Taylor & Francis Group.

Lützhöft, M., Nyce, J. M., & Petersen, E. S. (2010). Epistemology in Ethnography: Assessing the quality of knowledge in Human Factors research. *Theoretical Issues in Ergonomics Science, In Print*.

Maguire, M. (2001). Methods to support human-centred design. *International Journal of Human-Computer Studies*, 587-634.

McConnell, S. (1996). *Rapid Development - Taming Wild Software Schedules*. Redmond, WA, USA: Microsoft Press.

McNiff, J., Lomax, P., & Whitehead, J. (2003). *You and Your Action Research Project* (2nd Edition ed.). London: RoutledgeFalmer (Taylor & Francis Group).

McNiff, J., & Whitehead, J. (2006). *All you need to know about Action Research*. London: Sage Publications Ltd.

Meister, D. (1991). *The Epistemological Basis of Human Factors Research and Practice.* Paper presented at the Human Factors Society 35th Annual Meeting.

Moon, J. A. (2004). *A Handbook of Reflective and Experimental Learning - Theory and Practice*. Albingdon, Oxon, UK: RoutledgeFalmer.

Murphy, R. F. (1990). *The Body Silent* (Paperback Edition ed.). New York, NY, USA: W. W. Norton & Company, Inc.

Maanen, J. v. (1988). *Tales of the Field*. Chicago: The University of Chicago Press.

Neill, C. J., & Laplante, P. A. (2003). Requirements Engineering: The State of the Practice. *IEEE Software*, 40-45.

Neill, C. J., & Laplante, P. A. (2004). The Demise of the Waterfall Model is Imminent and Other Urban Myths. *Game Development*, 10-15.

Nielsen, J. (1993). *Usability Engineering*. San Diego: Morgan Kaufmann.

Pain, E. (2008). Playing Well With Industry. *Science, 319*(March 2008), 1548-1551.

Peräkylä, A. (2004). Reliability and validity in research based on naturally occuring social interaction. In D. Silverman (Ed.), *Qualitative Research - Theory, Method and Practice*. Los Angeles, CA, USA: Sage Publications.

Petersen, E. S., & Lützhöft, M. (2009). *A Human Factors Approach to The Design of Maritime Software Applications.* Paper presented at the Human Factors in Ship Design and Operation, London.

Petersen, E. S., Nyce, J. M., & Lützhöft, M. (2010). Ethnography Reengineered: The Two Tribes Problem. *Teoretical Issues in Ergonomics Sciences, Conditionally accepted for publication*.

Pew, R. W., & Mavor, A. S. (Eds.). (2007). *Human-System Integration in the System Develpment Process: A New Look*. Washington, DC, USA: National Academic Press.

Polkinghorne, D. (2003a). Generalizations and Qualitative Research - Issues of External Validity. In J. Lindén & P. Szybek (Eds.), *Validation of Knowledge Claims in Human Science*. Lyon Limonest: l'Interdisciplinaire.

Polkinghorne, D. (2003b). Validation in physical, organic and human realms. In J. Lindén & P. Szybek (Eds.), *Validation of Knowledge Claims in Human Science*. Lyon Limonest: l'Interdisciplinaire.
Popper, K. (1959). *The Logic of Scientific Discovery* (2002 ed.). New York, NY, USA: Routledge.
Quesenbery, W. (2005). *Usability Standards: Connecting Practice Around the World.* Paper presented at the 2005 IEEE International Professional Communication Conference Proceedings.
Reason, P., & Bradbury, H. (Eds.). (2006). *Handbook of Action Research (Concise Paperback Edition)*. London: Sage Publications.
Reason, P., & Marshall, J. (2006). On working with graduate research students *Handbook of action research: The concise paperback edition* (pp. 315). London: Sage.
Revans, R. W. (1980). *Action Learning - New Techniques for Management*. London, UK: Blond & Briggs.
Revans, R. W. (1981). The Nature of Action Learning. *The International Journal of Management Science, 9*(1), 9-24.
Richardson, L., & Pierre, E. A. S. (2005). Writing - A Method of Inquiry. In N. K. Denzin & Y. S. Lincoln (Eds.), *The Sage Handbook of Qualitative Research* (Third Edition ed.). Thousand Oaks: Sage Publications.
Rosson, M. B. (1998). Synthesizing Diverse Perspectives. *Journal of Computer Documentation, 22*(1).
Rubin, J. (1994). *Handbook of Usability Testing: How to Plan, Design and Conduct Effective Tests*. New York, NY, USA: John Wiley & Sons, Inc.
Rudestam, K. E., & Newton, R. R. (2007). *Surviving Your Dissertation, 3rd Edition - A Comprehensive Guide to Content and Process*. Thousand Oaks, CA, USA: Sage Publications, Inc.
Schön, D. A. (1983). *The Reflective Practitioner - How Professionals Think in Action*. London: Maurice Temple Smith Ltd.
Sherwood-Jones, B. (2008). Quality in Use Scoring Scale. Retrieved April 13th, 2010, from http://www.processforusability.co.uk/QIUSS/QIUSS.pdf
Silverman, D. (2005). *Doing Qualitative Research* (Second Edition ed.). Los Angeles, CA, USA: Sage Publications.
Simonsen, J., & Kensing, F. (1998). Make Room for Ethnography in Design! *Journal of Computer Documentation, 22*(1).
Sparkes, A. C. (2002). Autoethnography: Self-Indulgence or Something More. In A. P. Bochner & C. Ellis (Eds.), *Ethnographically Speaking*. Oxford, UK: Rowman & Littlefield Publishers Ltd.
Stevens, C. (1970). Tea for the Tillerman.
Stringer, E. T. (2007). *Action Research, 3rd Edition*. Thousand Oaks, CA, USA: Sage Publications.
Vaughan, D. (1996). *The Challenger Launch Decision*. Chicago: The University of Chicago Press.

Wickens, C. D., Lee, J. D., Liu, Y., & Gordon Becker, S. E. (2004). *An Introduction to Human Factors Engineering, Second Edition*. Upper Saddle River, NJ: Pearson Prentice Hall.

Wikipedia. (2008, January 17). User Centered Design. *Wikipedia*, from http://en.wikipedia.org/wiki/User-centered_design

Wikipedia. (2009, 17-04-2009). Journeyman. Retrieved 02-05-2009, 2009

Winter, R. (2002). Truth or fiction: problems of validity and authenticity in narratives of action research. *Educational Action Research, 10*(1), 143-154.

Ziman, J. (1998). Why Must Scientists Become More Ethically Sensitive Than They Used To Be? *Science, 282*(4 December).

Zuber-Skerrit, O., & Fletcher, M. (2007). The quality of an action research thesis in the social sciences. *Quality Assurance in Education, 15*(4).

Zuber-Skerritt, O. (2001). Action Learning and Action Research: Paradigm, Praxis and Programs. In S. Sankaran, B. Dick, R. Passfield & P. Swepson (Eds.), *Effective Change Management Using Action Learning and Action Research - Concepts, Frameworks, Processes, Applications*. Lismore, Australia: Southern Cross University Press.