Chapter 3
Drifting in Four Epistemic Traditions

The previous chapter mapped some of the most important characteristics in which constructive design research differs from professional practices and conditions for design. Our focus was on the implications of a shift from design practice to a knowledge-based discipline. We paid attention specifically to how this shift has been interpreted in constructive design research, and how this shift changes the outcomes of design. We saw a wide variation on perspectives from those focusing on how artifacts carry knowledge to those authors who want to turn design into a science. Although constructive design research focuses on artifacts and cannot exist without them, it differs radically from design practice in one respect, which is the context in which claims are justified. In design practice, the context of justification are the design world and the market. In constructive design research, the context of justification is knowledge and design research community.

This chapter build on this analysis but focuses on the lead concept of this book, drifting, and what happens to it when the underlying interpretation of knowledge changes. We focus first on understanding how drifting would relate to various perspectives described on knowledge described in Chap. 2, and then study an underlying variable behind these relationships. This underlying variable comes from our previous work on design accountability (Koskinen and Krogh 2015, and it builds partly on Michael Lynch's (1993) sociological interpretation of science as practical activity. It is worth to note that the epistemic traditions gives various prominence to drifting. For example the *experiential* tradition encourage drifting throughout all phases of constructive design research, while the traditions build in programmatic clarity and scientific compliance are recognizable for drifting primarily in the early phases of research. This is echoed in the balance of using the terms 'drifting' and 'knowledge' when describing each epistemic tradition.

A good starting point of our discussion is again design as a personal construct. In the first sight, drifting is a non-issue in this view. Taken to the extreme, if any decision is up to the designer, he does not need to justify drifting either; he just changes course in his design, redoes the design, and if the outcome is fine, there is no need to justify neither decisions that went into it, nor changes that follow. It is enough for

a designer to say that decisions are his, and there is no need for further analysis. There is no need to be methodic, articulate about how knowledge is embedded in an artifact, nor is there a need for a framework that details the meaning of the artifact. The argument is familiar from the art world, and from popular culture in which it is perfectly fine to tell that creativity is a secret. By implication, there is no need to account for drifting either.

If we look at the implications of the person-centered view to drifting purely in logical terms, the view means that the notion of drifting is trivial. Changing course in the middle of an evolving design has no need to be grounded in anything but the designer's decision. He/she can also just tell about the change retrospectively, locate the drift to something in his/her mind or work process. There is no way to contest this account. The designer can just bluntly say it is his design and nobody else has authority over it.

This is not the only belief about drifting, for sure. For example, design has also be seen as a methodic practice that has its ways of evaluating what is a contribution and what are the proper ways to do things. Designers are accountable to their peers, just like members in any other occupation and profession. There are also organizational accountabilities. If design is done in a company, it must use the methods others in the company use, and not only the outcome but also the process of making needs to make sense to its other members. In this context, designers need to use the tools of the organization, follow its processes, and use patterns of reasoning others can understand. If their work deviates from the ways of the organization, other members of the organization may not understand design decisions, and may sanction the designer.

The hypothesis of this chapter, then, is that drifting has a close relationship to how knowledge is understood. With this hypothesis in mind, we can identify four belief systems about how knowledge drives drifting in design. We call these belief systems 'epistemic traditions' to underline their historical character. The first builds on a long tradition in art and design. It has found a clear protagonist in the *Presence Project* (Gaver 2001), and is shared widely in art and design schools and design consultancies all over the world — we term this the *experiential* epistemic tradition. Another tradition is *methodic* — thus its name. It is familiar in engineering and it has found protagonists from several research communities since the fifties. The third tradition is more recent and builds on the idea that knowledge resides in research discourse and framed by programs, which also drives drifting — we call this *programmatic*. Finally, we describe a fourth tradition in which drifting stems from mutual learning — this we term *dialectic*.

3.1   Experiential Tradition and Drifting

Constructive design research can first be seen in terms of design practice. This epistemic tradition is prominent in the documentation of Presence Project referenced in Chap. 2 and later in Bill Gaver's paper *What should we expect from Research*

through Design? In this paper, he tells that 'theory underspecifies design' and argues that design is different from a Popperian definition of science in that design has a '…tendency to make generative statements rather than falsifiable ones.' (Gaver 2012). It is however Kristina Niedderer, who has strongly argued for accepting practical experience as a source of knowledge (see for example Niedderer and Roworth-Stokes 2007).

Looking at the corpus of this book this approach is echoed in among others the work of designers and writers like Jayne Wallace (Wallace 2007) who stay close to traditional design world and drift mainly within the design process. In her PhD work she tries to articulate a way to give more freedom to design decisions that are hard to capture in rational terms. For her, drifting is a matter of a design process and people engaged in it. Her specific case is jewelry designed for individuals. The attempt of the work is to demonstrate that contemporary jewelry design, including the treatment of digital technologies may result in meaningful objects. If the process tells designers to drift, a drift is justified. If we follow her, the value and credibility of the work is not the documentation of design ideas and skills in the process, but the capacity to link information collected in the process, in this case the adoption and redesign of cultural probes she calls 'stimuli' (Gaver 1999). The evaluation of the knowledge created is the capacity of the objects to resonate with its prospective users. It is not in any specific experiential manner determined by the designer, but by the potential of jewelry to find meaningful ways to enter into the lifeworld of the individual people.

The design sensitivity and relevance of the contemporary jewelry designer is further supported by the personal coding (Fig. 3.1) of interviews after the recipients have had a change to live with Wallace's objects (she calls them 'pieces') for about onemonth. She says about the research reasons for giving the objects to the people they were designed for:

> I use the term *hypothesis* metaphorically here; the pieces acted as propositions in the manner of a hypothesis, the existence of which begged testing in interaction with the particular people the pieces were made for. (Wallace 2007: 147)

The argument is that if such designed objects may do this, contemporary jewelry design has valuable competences to offer the design of digital objects.

Another example from our corpus that adopts the argument of an experience being of value because the objects it produces are appreciated comes from a dissertation published by Aarhus School of Architecture in DK, the author, Mo Michelsen Stochholm Krag (2017), who calls his approach 'a counter-practice.' This practice bares the character of interventions in the shape of artistic reshaping of abandoned vernacular buildings in rural village areas to serve the purpose of pointing to an alternative foundation for discussing: decay, preservation, demolition, and transformation beyond measures of economy, identity, and classical guidelines of restoration.

The background for this, in short, is the intensified move of people, that may be witnessed in most countries globally, away from rural village areas and into larger cities, rapidly eroding the notions of liveability that used to define such areas. When
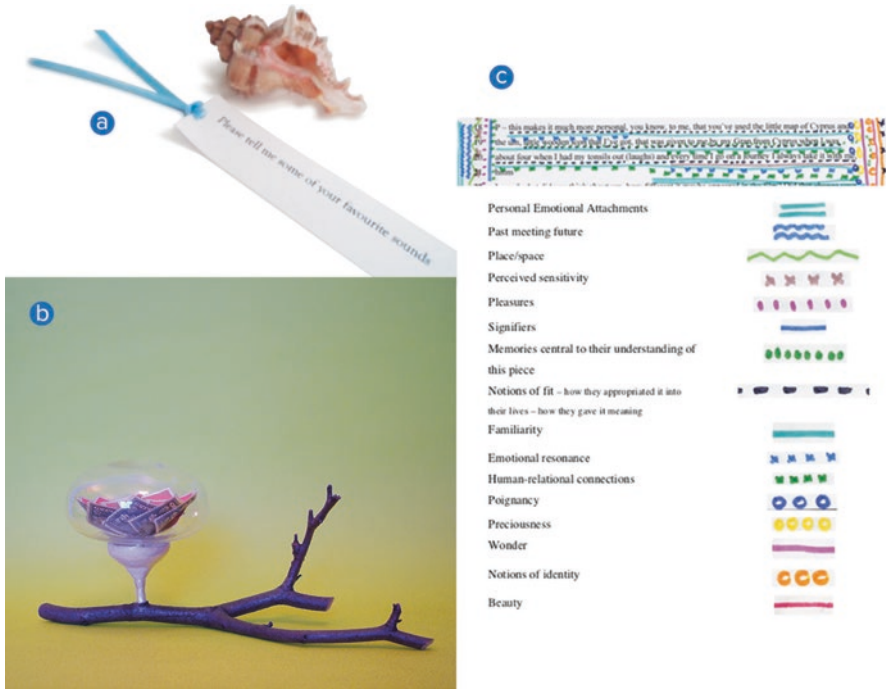
Fig. 3.1 (**a**) Sample of Stimuli, (**b**) The jewelry piece: Blossom, (**c**) Authors coding of interview statements

older buildings are left, rapid decay follows. When institutions (e.g. schools, public authorities, shops) are left, the places are not just empty of function, but also become reminders of the type of life that is no longer supported. This abandonment and decay can be measured in the weakening of local economy as assessed by classical guidelines in terms of the loss of aesthetic quality and cultural disillusionment. Using the same indicators and guidelines the government in Denmark financially supports the demolitions of abandoned buildings, a downward spiral seems inevitable, argues Krag.

A key element on the PhD work of Krag is a practice-informed approach exploring an aesthetically informed strategy to transformation. A significant part of the dissertation is based on cuts made to buildings with power tools by Krag and students of architecture. The work takes place in Thisted, which is one of the most depopulated municipalities in Denmark (Fig. 3.2).

The strategy merges the need to educate students of architecture in the actual technical structure of buildings with creating artistic statements that allows local inhabitants to re-evaluate a building prior to demolition. These interventions are termed as physical dissections. They are explored and slightly modified over the cause of several iterations termed 'generations.' The interventions produce cuts that resemble classical 'intersections' and 'building biopsies' which are exhibited out of

Fig. 3.2   Pictures from Krag's PhD thesis: (**a**) The physical sectioning of a school, (**b**) biopsy, (**c**) powertools

context in a school of architecture. Beyond the purpose of educating students of architecture the interventions also are attempted to articulate intangible cultural values not to decision makers but to the residents of the village. During the performance of the interventions the site and building subject to dissection becomes a meeting place for the villagers to share stories about former inhabitants, the meaning of the place, and the historical ramification of its activities. By reference to the values identified in the UNESCO 'Conventions for safeguarding Intangible Cultural Heritage', the capacity of the interventions to prompt such narratives is used as a support for the claimed quality of the dissection. As may be read from above drifting happens at least three levels: The capacity of the students in dialogue with the physical state of the building conditions the dissections and the actual activities are changed over time framed by Krag as 'generations' of interventions. And finally, the perceptions of the dissections as expressed by local people and stakeholders, both affect the actual cuts and the potential stories to be told.

What connects the two examples are the way that the subject of design directs the course of action and becomes the key motivator for drifting. The produced objects and interventions become a material hypothesis of the claims made, and carried with the ambition of approval and recognition by the people engaging with research. A key element in this is that debate is brought back to the people that are the key recipients of these statements. The correspondence between statements from people experiencing the design production and the character of the hypothesis completes the statement that drifting has occurred. It is the resonance and effect of their artistically inspired artefacts in harmony with the people that becomes the measure of their research. Produced artefacts become the evidence of the knowledge produced.

This view has radical implications to how we understand drifting. As a logical argument, it takes us very close to the person-centric view, which does not care about drifting as long as the outcome is good. In practical terms, this is not true, however. For example, Presence Project (2001), which introduced the distinction between epistemological and aesthetic accountability, was designed to question whether design has to be laid on scientific grounds. Yet, the tenor of the project was anti-market, and its research process included phases that can be seen either as design or as research.

Presence Project is relevant in another way as well. Frayling's (1993) concept of research through design left open how design can lead to knowledge. Because it was done at RCA slightly after Frayling's essay, the project is a good proxy about what he was thinking about the early nineties. If this is so, we can say that Frayling's concept aligned design research very closely with design — as the term already suggests — but it remains ambiguous about whether it is design or research that gets priority. The question about which one is more important is probably meaningless, and best left to be decided by researchers themselves, but it is worth pointing out that Frayling's term is ambiguous in terms of its implications.

3.2   Methodic Tradition and Drifting

A polar opposite to the art and craft view has been expressed in design engineering literature. In terms of its implications to drifting, the methodic view of Blessing and Chakrabarti (DRM 2009) — and their predecessors in the Ulm School of design, in design methods movement of the sixties, and successors most recently under the Delft Method — could hardly be more different from the traditional, person-centered notion that gives a designer authority over drifting.

The *methodic* epistemic tradition, as we term it, in fact goes to the other end by locating authority over design to knowledge produced by those methodic practices that define the shape of the design process. In doing so, it paints drifting either as an illegitimate practice, black art that needs to be rooted out of a rational design process, or sees it as method variance that has to be controlled. It is a threat to rationality and the rational worldview in the behind this vision: any act of drifting needs to be grounded in methodic knowledge, and any act of drifting has to be justified by this knowledge. Taken to its logical conclusion, design would become like any field of engineering: not quite science, but almost. When its methods are perfected, they become vehicles for creating knowledge and then eliminates hunches and personal whims from design.

This view, of course, neither rules out novelty nor turns designers into pawns of method. In this view, drifting can happen in many ways. It can be built into the method. The key word is control rather than banning drifting. Drifting can happen, but it has to be controlled. Most typically, this takes place in terms of decision points in the method, or in industrial language, in gates in which designers make decisions about whether or not to take the project further, and in which direction to go. These decisions are primed by the previous phases of the process, and presented as

decision alternatives. The process is rational in that any instance of drifting must be subjected to explicit evidence. The process is designed to rule out tacit knowledge and person-dependent hunches of the sort Wallace and Krag propounded.

Drifting can also happen in thinking and the early research phase. Most descriptions of design in engineering depict it as a process in which there is a lot of freedom in the early stage of the process, but very little in the later stages. This reasoning behind this shape is usually grounded in economics.

When looking to our corpus, the methodic epistemic tradition is particularly evident in the Dutch dissertations from the technical universities in Delft and Eindhoven. The production is rich and the dissertation often true to the tradition. There are exceptions though, like Ambra Trotto who in 2011, handed in the thesis *Rights through Making*, which was exploring how processes of design may emphasize the experience and promotion of human rights. In line with the tradition, *Designing for Rich Interaction* was the title of the dissertation of Joep Frens in 2006. Building on theories on affordances, Frens (2006) believes that 'design[ing] for interaction is to design the form-properties of a product that comprise the interface' with particular emphasis on cognitive, perceptual-motor, and emotional skills…' Based on the research interest and potential contribution — the rich interaction framework — a tangible digital camera became the pivoting point of his dissertation. It was tested in the dissertation to learn about the rich interaction framework. The selection of design alternatives and choices are rationally argued, which turns his cameras into hypotheses that could be tested. The three major research activities of the work are performed as scientific experiments:

1. A comparative study of lab based usability experiment including the rich interaction camera and a classical contemporary digital camera design.
2. To remedy the shortcomings of the first experiment, a working prototype of the rich interaction camera including four interface variations was build.
3. Finally, the rich interaction camera was subject to real-world testing by a total of 24 participants in a photo studio where a protocol of Marc Hassenzahl's product quality assessment scales (2004) was deployed.

The test results were coded according to the camera variations tested, protocol questionnaires used and grouped according to which research interest is enlightened by the data collected (Fig. 3.3).

As can be viewed from the above, this is an attempt to rationalize design decision that directed the building of the camera. Drifting is controlled, but still happens. Despite its attempts to be scientific the thesis, however, also builds on creative practices and choices typical to any design process.

One of the virtues of this vision is philosophical in nature. This view would turn even invention in the very beginning of design into a rational exercise. This is probably too ambitious, looking at what philosophers of science regard as mainstream. After Karl Popper's falsificationist philosophy of science, some philosophers have for decades made a distinction between the logic of invention and the context of justification. In the sciences, the latter should be as unambiguous as possible, while the early phase can be inventive. Invention almost by definition has no logic; it becomes the place for creativity. The view is not practical either. Indeed, Overbeeke
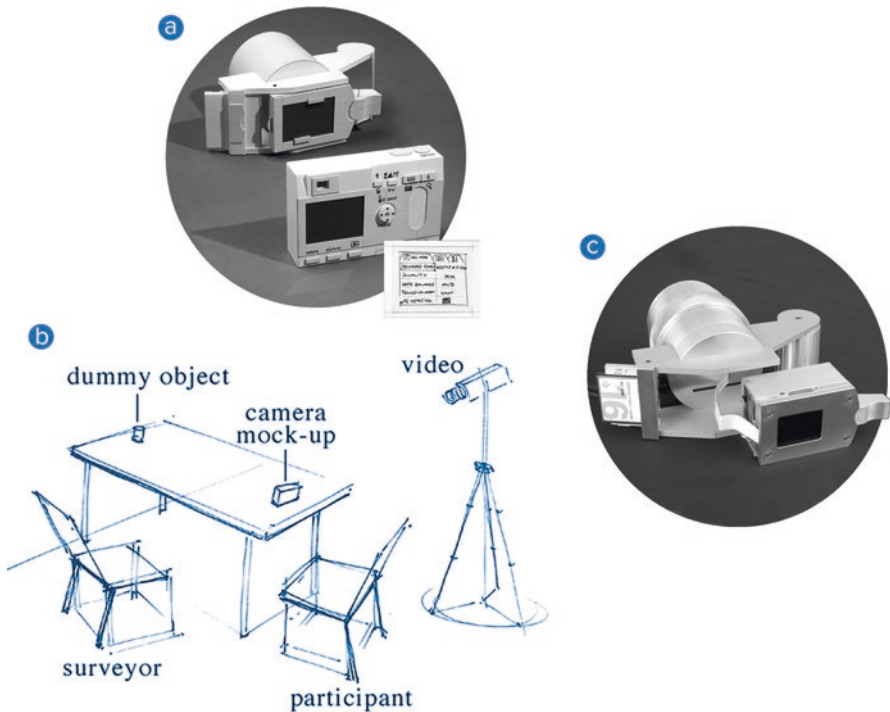
Fig. 3.3 (**a**) Cardboard cameras for experiment 1, (**b**) Lab test set up for experiment 1, (**c**) Final prototype

did not go this far in his own research work, which departed from his vision significantly.

Although this view is probably wrong if taken too far, the worldview it articulates is attractive to those who have grown up in the mathematical worldview of the sciences. This is how the formal sciences work, after all. Inspiration can come from anywhere, but when proving a theorem, mathematicians must follow the rules of their branch of mathematics. The main reason to be sceptical about this model is that as soon as we leave the formal sciences, we tend to see lots of methodic inventions and tricks of the trade that make research work. The belief that method variance, as it is known in statistics, could be eliminated completely, is probably overly ambitious and so unpractical as an ideal that it is better to leave it to elementary textbooks.

3.3 Programmatic Tradition and Drifting

When we turn to the idea that knowledge advances through frameworks, drifting happens in frameworks and research programs — thus the name *programmatic epistemic tradition*. One of the more interesting findings of Chap. 2 was that we saw

how the debate about research through design has broken into several lines. While some researchers have followed the message of Frayling and turned their attention to design artefacts, others have turned their attention to the conceptual and theoretical scaffoldings of these artefacts. This has been the line best known from the work of two researchers based in Pittsburgh, Jodi Forlizzi, John Zimmerman, and their colleagues Shelley Evenson and Erik Stolterman, the latter working in Bloomington, Indiana and Umeå, Sweden (Zimmerman et al. 2007, 2010).

This view sees frameworks that illustrate reasoning in design and generalize from it as crucial sites for producing knowledge. In this view, drifting occurs to some extent in design work, but more importantly, it occurs in conceptual work in which researchers create frameworks and theories, and debate their pros and cons. If we think about drifting in this view, it may happen in several ways. It may happen in design projects, but also their conceptual environment. Researchers build on their research predecessors rather than design exemplars, as practitioners would. There can be a lot of ambiguity in design objects, and it is the job of the debate about frameworks to clarify this ambiguity.

The programmatic epistemic tradition is fairly pervasive in the Nordic countries. In the following we exemplify this through an early example Martin Ludvigsen's *Designing for Social Interaction* in 2006 and recently Yiying Wu's *Bicycles and Plants* in 2017. Through a set of design cases most prominently analysed in the perspective of Erving Goffman's (1978) model of social encounters Ludvigsen identifies a framework for Social Interaction and a model for Situational Interaction Mobility. The latter is presented in order to '…describe[s] the change in level of social interaction in the framework.' (Figs. 3.4 and 3.5).

The category of 'the collective user' is his contribution to the framework which depicts how technologies foster particular social relations. A banal example of the below would be: a table is located in a room, everybody knows it is there. However, the table is largely unnoticed (distributed focus). Someone come in and brings to the

Fig. 3.4 Ludvigsen: (**a**) iFloor, (**b**) Media surfaces, (**c**) Star catcher

Fig. 3.5 Martin
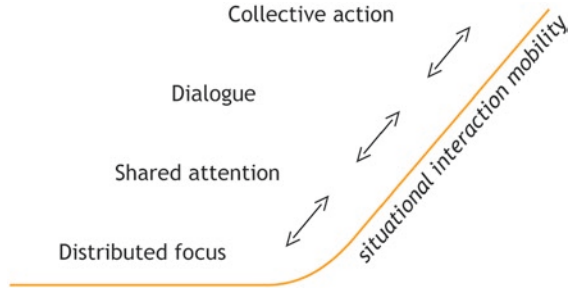Ludvigsen: social
interaction in the
framework

Fig. 3.6 Plant hotels in different social contexts: community, gallery and university

attention of all present that the table needs to be moved to the room next door
(shared attention). Discussion emerges about what and how to do next (dialogue).
Due to the size and shape of the table at least two persons are needed to carry and
coordinate actions in order to get the table out the door (collective action). At the
time of the research work, little attention had been brought to the qualities of the
final category. *iFloor Project* was maybe the first interactive prototype to point to
this, and facilitated to infer yet overlooked design opportunities of digital interactive
objects. Ludvigsen's participation in a larger research center for Interactive Spaces
(2002–2009) in Aarhus, Denmark, allowed him to drift between projects in search
of design frames with the best opportunity to inform his research interest on 'How
to design for Social Interaction?'

Another, drifting, framework building design researcher is Yiying Wu (2017).
Inspired by the framework for Social Innovation (Ezio Manzini 2015) Wu pays
particular interest in designing with 'creative communities.' In this perspective, she
follows and analyses six international and Finnish cases that serve as inspiration for
her final construction of a 'plant hotel' (Fig. 3.6).

In this process Wu drifts in at least two significant ways. First, she changed per-
ception of the designer role — anticipated to be the skilled helper based on record-
ings of context, but rather than being the expert she became the learner through
adoption:

> Hence, instead of using this piece of ethnography to inform design, I positioned it as a mir-
> ror to re-examine normally unexamined design… My designerly response was to open a

workshop of a similar kind by myself… It should be a service setting where people come to work for others. 'Work' refers to the notion of a capable being with a sense of responsibility and a high level of participation. 'For others' refers to intensive social relations and interactions among participants. (Wu 2017: 43)

Second, originally the Plant Hotel was envisioned to be one of three different service design interventions. But the capacity of the concept to probe social relations and amplify a sense of giving and fostering care rendered it to be a strong tool in exploring service design as a social practice instead of its traditional field of study: management and engineering. And her deployment of the concept in five different versions and contexts helped her build a program that reveals how design can be used as a means for anthropological studies (Fig. 3.7). This work shares several overlaps with Joachim Halse (2008) whose thesis *Design Anthropology: Borderland Experiments with Participation, Performance and Situated Intervention* explored some of the same phenomena, but from the perspective of anthropology.

As can be witnessed in the work of both Wu and Ludvigsen contributing to existing frameworks point to these becoming programs for constructive design research. Ultimately, these programs change expectations, perceived standards of design, as well as perceived standards of proof.

At first sight, this sounds antithetical to the credo of Presence Project. What could be more different from claiming that drifting is driven by the myriad of decisions designers make in their studio, and that drifting happens in research world debates? When phrased this way, the views are different indeed. Yet, it may also be argued that these views are in fact quite a bit closer than they seem in the first instance. We see this argument as only one way of capturing drifting, and in fact, this view complements the view of Presence Project. We do not see any significant

PLANT HOTEL					
Social setting	In a neighbourhood gallery, Helsinki	In front of the professors' office, Helsinki	At an academic conference, Stockholm	In two elderly service centres, Helsinki	At the border of North & South Korea (speculative)
Social relations	How shall we treat our neighbours?	How shall we treat our professors or students?	How shall we treat our guests?	How shall we treat the elderly?	How shall North & South Koreans treat each other?

Fig. 3.7 Framework of how design implementation of a 'plant hotel' probe social relations

conflicts with the idea that drifting is driven by user studies either. It can be a function of user studies, but it can also take place later in a design process.

Looking at the notion of drifting, the idea that objects may remain unchanged while discourse changes sounds illogical. However, it is not necessarily so. In any field of research, there is theoretical debate that tries to find explanations for the field's facts and observations. Observations remain the same, while theory drifts until it settles. Design is no different in this regard, we believe. Explanations given in the first hand by researchers who have done research have a certain degree of authority, but there is usually no need to think their accounts are authoritative. Another reason for thinking that this is in fact normal is that there is no reason to think that artefacts in the center of constructive design research can be emptied in any one account. Many artefacts produced by researchers can be seen in many ways, and if frameworks are how researches make sense of these interpretive possibilities, so be it. In this tradition, discourse drives any field of research probably more than artefacts or observations.

It is also worth pointing out that this view encourages drifting very much in line with of Christopher Frayling. The main difference is that it encourages researcher to give conceptual handles to understand their design — it establishes a program. These handles help other researchers to make sense of design work: where it came from, what was the problem it dealt with, how the solution evolved, and what can be learned from it. Drifting happens in research projects, but also in discourse around them. Frameworks facilitate drifting and are a crucial part of it.

3.4   Dialectic Tradition and Drifting

In line with the interest into the social life world exhibited by Ludvigsen and Wu we now turn the notion of *dialectics* as a driver of drifting. Many of the dissertations included in our corpus involve users in processes of design. Users play many roles in the corpus, however: they are a source of inspiration, co-designers, evaluators, and even guinea-pigs. This has led us to shed a particular light on the dissertations that are driven by the involvement and change impact that the prospective user of design artefacts. Here designers work in a community, encourage these communities to voice their views, and in a dialectical manner help the community to surpass its initial starting points. The process runs from theses through antitheses to syntheses, but in design almost always without a philosophy of history. The main exception may be activity theory, which builds on Vygotskian Russian psychology in debt to Marx (see Kuutti 1996).

Previously, we have briefly talked about empathic and participatory design. We argued that they each introduce a different kind of idea of how knowledge is construed and how knowledge conditions design. The heart of the issue is that when including and studying people in research, knowledge will almost never be precise. The main exceptions are areas such as demographics and movement between cities. The reasons for imprecision are familiar from the social sciences: correlations are

weak; there are so many intercorrelations that any explanation can always be contested because it always neglects some background variables; people react to their circumstances and can choose their line of action; and ethical reasons make controlled experiments in the scientific style impossible.[1]

Knowing this, many designers have drawn the conclusions. They are happy with creating knowledge they need in participating with people, and they do not claim that their knowledge is authoritative. As indicated above, there are significant differences between empathic and participatory design. To unpack them, we study two more Scandinavian constructive design dissertations to illustrate how drifting differs in them.

The Helsinki-based designer and professor Tuuli Mattelmäki (2006) sees her craft in dialogical terms. For her, design ideas are meant for participation, where they are supposed to live for the duration of her research projects. The knowledge she creates is for her not an unshakeable foundation built on knowledge, but a temporary base that helps design forward. She also rejects the idea that designers should be flies on the wall, observing people: design is about change, and designers are change agents, and she does not want to betray her tribe by telling their traditional ways are somehow flawed only because she sees herself as a researcher. Her research methods are meant to serve as conversational props that prime people to think about issues she finds relevant to her design work.

These convictions are evident in her language. She described her approach as empathic, and sees it as a form of co-design, and she sees herself as a facilitator rather than an expert, who knows what people need better than the people themselves (Fig. 3.8).

Christian Dindler (2010) delivers insights on how institutions such as museum and archives may move their conception of exhibitions concepts from the perspective of visitors as passive recipients of experiences to active participants who co-construct engaging experiences. He does so by narrating what he terms 'Fictional spaces', in which participants may co-imagine acts and connections of the exhibited artefacts. The objective of the design activity is thus not an artefact, but the capacity to involve participants and change their perception of what an engaging museum may entail.

In the early days of Participatory Design in Scandinavia — then called Cooperative Design — the aim of such processes was to develop technology and

---

[1]This has been said particularly colorfully by Bruno Latour and Steve Woolgar in their book Laboratory Life from 1979: 'Occasionally, when members of the laboratory derided the relative weakness and fragility of the observer's data, the observer pointed out the extent of the imbalance between the resources which the two parties enjoyed. 'In order to redress this imbalance, we would require about a hundred observers of this one setting, each with the same power over their subjects as you have over your animals. In other words, we should have TV monitoring in each office; we should be able to bug the phones and the desks; we should have complete freedom to take EEGs; and we would reserve the right to chop off participants' heads when internal examination was necessary. With this kind of freedom, we could produce hard data.' Inevitably, these kinds of remarks sent participants scurrying off to their assay rooms, muttering darkly about the 'Big Brother' in their midst.' (Latour and Woolgar 1986: 256–257)
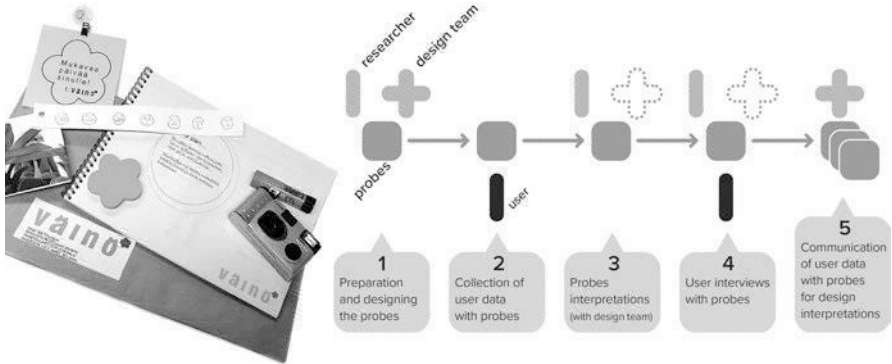
Fig. 3.8 Collection of probes and model of analysis as applied in Mattelmäkis dissertation

systems design that would enable *quality* of the technologies, *emancipate* the workers and *democratize* the organisation of work (Ehn 1988). The focus of design quickly moved from software and systems development to educating workers on the properties and consequences of digital technologies. While this academic heritage runs as an undercurrent in Dindler's dissertation, it became evident in a later project (Dindler et al. 2011). A regional museum of archaeology in Denmark approached him with two concerns: the number of visitors to the museum were decreasing; and due to Danish treasure regulations their most valuable artefact — a mummified bronze-age woman — had been transferred to the National Museum. To remedy this, they had applied for and been granted funds to install a digital (VR) version of the woman.

Rather than immediately jumping on to the bandwagon to produce the requested installation, Dindler created a counter-brief and opted for a *dialectic* participatory design process. Already here the project drifted: this move brought tensions among personnel to the surface. These tensions were about who got the idea, who applied for the funding, who wanted something else, and so on. When settling such disagreements through co-design workshops, a further drift in focus enabled Dindler to see that what might unite all museum personnel was the aspiration to become a regional center for archaeology rather than a collection of artefacts. The installation designed in the project became the temporary materialization of this potential future. (Fig. 3.9).

This process shows how the value for the personnel was not the installation, but the opportunity to re-orient the organization from a keeper of culture to a research hub. Studies like (Bossen et al. 2010) similarly argue that the real value of participatory design is not always the influence on the actual design, but equally often the human and professional competencies build during such processes — the *dialectics*.

Mattelmäki builds her approach on a long history of user-centeredcentered design, and she has occasionally also been publishing her work in participatory design conferences. She has also been working with several Milanese designers, whose approach has shifted from scientific and systemic approaches to a human and

Fig. 3.9 An interactive burial mound, where digital images of treasures are projected on to the dirt as by tracking technologies are they revealed through removal of dirt

social direction. Their word of choice has, like Mattelmäki's, been dialogue (Manzini 2015 on cores theme). Just like the early participatory designers were concerned with fostering change and allows (all) participants to knowingly transcend current social practices, this has been true of Mattelmäki's work as well.

All this is well in line with interpretive social research, which tends to see its outcomes not as authoritative statements of knowledge. For example, the sociology of professions has since the sixties been fascinated about well-informed middle-class patients who come to the doctor's office ready to tell what is wrong with them and have difficulties in accepting the diagnosis. In science studies, the fall of authoritative knowledge has been well captured by the sociologist Helga Nowotny, who distinguished Mode 1 and Mode 2 knowledge. Mode 1 knowledge refers to the era of big science fueled by cold war, where science gained a largely autonomous role as long as it could deliver the weapons. Mode 2 in contrast describes an era in which knowledge becomes negotiable, and has to be robust rather than valid to survive in public discourse.

In the dialectic epistemic tradition, beliefs about knowledge get grounded in the community in which knowledge is created. Knowledge has to be robust to survive in conversation, but the aim is not to create knowledge claims that would survive years or even centuries. These beliefs have profound consequences to how drifting is supposed to happen. Drifting happens if people in the community say so and if a designer like Mattelmäki finds this fruitful for her project. Design ideas have to survive the dialogue, and designers need to get prepared to respond to surprising, ill-informed, combative, and even mean arguments targeted at their design. They also must safeguard against giving people a right to veto their designs.

All this detaches design from strong knowledge claims, and pushes the source of change to designer-people dialogues. Unlike in earlier versions of user-centered design, designers are not required to conduct careful studies that lead to valid knowledge that then informs design. Rather, they need to study people, work with them in a co-design fashion, listen to them carefully, and react to what they are being told. Knowledge is a secondary concern to the human connection — the dialectic character of the tradition.

While having listed and argued for the traditions above there are hybrids, like Otto von Busch 2008 dissertation which are impossible to describe unambiguously according to either of the four epistemic traditions. Although most of the dissertations does include elements from more than one tradition, they often lean towards one of them.

3.5   Drifting, Accountability, and Context: The Art of Being Robust

This, and prior, chapters has made several references to the 'context' of research. We have used the term 'context' on purpose because we believe that understanding any practice (and in our case, design practices in line with epistemic traditions) requires paying attention to where it comes from and where it is intended to contribute to. This is a lesson we have learned from sociology of science and technology, which has repeatedly shown that scientific statements — and just as any other statements — get their meaning in context. For example, the concept of 'mass' has a definition in physics, another definition in cancer research, and a third in communication studies. It would be worthless to argue which is the best; all have value in their own right. This argument has been expressed in design literature by Jung-Joo Lee (2012), who claims that the success of cross-cultural design methods depend on the practical base of these methods. She argued against the idea that research methods are universal and portable from one culture to another.

Although these are philosophical and sociological discussions meant to answer questions in philosophy and sociology, they have informed our thinking. For us, they tell that to properly understand constructive design research, we need to study it in those contexts in which it is being made. What is knowledge in one context may not be it in another. In turn, this means that we can understand better how research works. Some of the apparent incompatibilities we see in design research disappear when we put research in context; we may also see how some apparent agreements turn into incompatibilities. For us, this context is partly practical, consisting of things like instruments, measurement conventions, and notions of proof. It is equally much intellectual, consisting of those discourses in which findings are framed and debated, contested and accepted.

Our way of probing the contexts builds on our work on *design accountability* (Koskinen and Krogh 2015). We have argued elsewhere that design research is accountable to design practice and design research alike, and that solid research

either acknowledges the boundaries set by these environments, or risks being labelled as irrelevant. This will be a recurring theme in the following three chapters and in particular Chap. 4. If we are correct, design researchers talk to multiple audiences simultaneously and have to find a way to select who they want to be accountable to. Even though we do believe in the importance of design accountability, we also know it has limits in research. Taking it too far would push design research back to design, which would not be fruitful in a discipline that tries to build a research practice and a discourse it may share with other disciplines.

If this view is correct, it tells about where to find some of the limits of drifting, and how far it can go. The room for drifting can be limited if researchers work in an engineering-oriented environment that tend to stress methodical rigor in ways that would not be appreciated in design based cultures that put premium on contribution and relevance, or art-oriented environments that expect surprises and controversy spurring imagination.

How far can drifting go amidst these surrounding beliefs? To full anarchism in which everything is open all the time because researchers can freely choose their context? The answer to this question is a clear no. Even when researchers like Wensveen start their studies from cultural probing and finally end up testing their theories with statistics, they respect the rules of each part of their study. What is regarded as knowledge — or acceptable and interesting — varies, but if research wants to be good, it has to be on par with the best practices in each of its subsections. Importantly, accountability sets limits to drifting: if design research is aesthetically accountable and drifts freely, it has to be able to face criticism from practicing designers, who have their own terminology and way to define their work (as Anna Valtonen 2007 has suggested). If it is epistemologically accountable, it has to survive the criticism of fellow researchers.

It is good to keep in mind that although we believe that to understand constructive design research, we need to look at it in its context of production, we do not believe that this context in any way explains what researchers do. This would be a simplistic, causal argument about the relationship between action and context. Rather, we think that beliefs about the context and the role of knowledge in it are built into research. After researchers have defined a relevant context, they also construct beliefs about who they are they accountable to. The context is *made* relevant and consequential in debate; constructive design researchers choose their paths and act on values dear to them. The values come from four main traditions we have described: the artistic quality and spurring imagination – *experiential*, the methodological strictness and enabling predictability – *methodic*, the theories, frameworks and advancing programs – *programmatic*, and the activist result changing participants perception and enactment of everyday life – *dialectic*. The three following chapters dive into more detailed activities for creating knowledge claims and analyzes drifting in them. They unpack how hypothesizing (Chap. 4), experimenting (Chap. 5) and evaluation (Chap. 6) happens in constructive design research, and how the interest of both serving knowledge production and relevance causes drift. The pivoting point for the following Chap. 4 is the presentation and detailed description of the Knowledge-Relevance model.