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Articulating Knowledge From the Vikings to the Digital Age: Designing Digital Artifacts in Research.

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This paper discusses the design approach for participatory design of digital systems and routines for qualitative, cultural-historical research and reconstruction of a Viking boat. The digital system involves recording, digitalizing, editing, categorizing and archiving audio-visual empirical material. The design work involves adaption of heterogeneous technologies to help the researcher in his methodological and analytical work. Concepts on negotiaton from actor-network theory and on activities are used to suggest theoretical approach for participatory design of heterogeneous systems in research.

Articulating knowledge from the Vikings to the digital age: designing digital artifacts in research

Abstract

This paper discusses the design approach for the design of digital systems for cultural-historical research on the reconstruction of a Viking boat. The digital system is used for storage and analyses of digitalised audio-visual research material, and involves use of video for documentation, archiving, categorizing and record, and a content management systems for mediation of the research. The design work involves adaption of heterogeneous technologies to help the researcher methodological and analytical work. Concepts from actor-network theory and activity theory are used to suggest an approach for design work based on connecting heterogeneous systems and artifacts.

The design of digital systems for qualitative, cultural historical research is one example of how design divides, transforms and builds knowledge. Digital audio-visual research material offers new possibilities and restrictions for the researcher in his knowledge-building work, both in methodological and analytical tools and media.

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We report on an early phase of a funded collaborative design process in which the intersections of researchers, digital tools and design processes are being established and negotiated. The project **RENAME** (REsearch, NArrative and MEiation) is based on participatory design principles and practices. The participation and collaboration involves a primary researcher, an ethnologist, who is also the boatbuilder of a Viking ship. He is an active partner in the design of the digital artifacts for his own ongoing research project. The partnership includes a network of actors with theoretical and practical expertise; from cultural history, media and communication, and information systems design.

Our design work cannot build on existing research practices using digital media in the fieldwork process, nor on the designers understanding of the researchers needs, as methodical practices with digital material are still emerging. The paper proposes

theoretical concepts for such experimental, unfolding design work where the role of the designer is implicated in a network of heterogeneous actors and systems.

Use of digital media for visual, cultural historical research

Use of digital, audio-visual media in cultural-historical research has resonance in visual anthropology (Collier 2001) and visual ethnography (Pink 2001) where use of visual research material for attaining deeper understanding of cultural systems and patterns (Collier 2001), or for studying the visual part of communication in interaction studies (Goodwin 2001) is discussed. Digital media suggests new possibilities for visual analysis and “involve more significant methodological innovations in both data gathering and analysis” (Collier 2001:56). These innovations focus on the methodological and scientific outcomes of visual material, as immediate analysis of digital snapshots via a laptop computer, or quick annotation of information in digital research files. The role of the media or digital artifact in the analytical work has a background in anthropological and material culture discussions.

Cultural historical research is mainly based on textual analysis of representations of items or on qualitative interviews. Cultural-historical knowledge therefore has been built on the analytical translations and interpretation made by the researcher. Reflexivity in the research process has been stated as important in these interpretative studies. The point of departure for our design project is that digital media are especially useful for achieving what have been called reflexive methodologies (Alvesson & Sköldbberg 2000). Digital video gives opportunities of immediate analyses in the research field and with the research objects in question; the digital camera offers quick editing on the computer, with tags and annotations that are searchable in a more detailed way than analogue photo, film or video material.

The Gokstadboat project

The Gokstadboat project aims at reconstructing a Viking boat found in 1880 in one of the biggest digs of Viking-ships and boats in Norway. Three boats and remnants of the Gokstadship were found in a king's grave at Gokstad near Sandefjord south of Oslo. The Gokstadship and the three boats were found to be cut into pieces and packed flat in the grave. The ship was reconstructed in 1945 and now stand in the Vikingship museum in Oslo. Two of the boats were reconstructed in the same way, partly with new wood, partly with the original wooden fragments. The reconstructed boats and ship in the museum give an impression of completeness and truth, as if there is no doubt about the form and shape of 900 year old Vikingships. Since

reconstruction, the third boat has been stored in the museum storerooms in approximate 200 pieces and fragments, as found in 1880 (see Fig. 1 below).



Fig. 1: The fragments from the third Gokstad boat in storage at the Vikingship Museum, Oslo.

The Gokstadboat project aims at interpretation of the boat, not by filling out missing pieces with new wood, but by building a new boat using the fragments as guides. By using tools from the Vikings, the researcher and a boatbuilder are in the process of reconstructing the Vikingboat by reactivating the activities and knowledge that the Vikings used for making the boat. The researcher ethnologist is concerned with the processes of building the boat, rather than the final shape of the boat. In this way he tries to understand the logic of Viking-technologies by way of their constructions. In this activity-based, cultural-historical research approach, one goal is to show how knowledge of the building of wooden rowing- and sailingboats of today can be connected to the Norwegian Viking boat-building traditions.

Video is being used to document and analyse the research process as well as the processes of building a paper model and the boat being built in wood. Video is being used to conceptualise the Gokstadboat reconstruction as a process of translation and interpretation, instead of as a process of findings and results. The digital video material provides possibilities for immediate analysis of detailed actions, as well as comparing processes and actions in the boatbuilding.

The RENAME project

Our ongoing research project, RENAME (Research, narrative and mediation), focuses on three levels of the Gokstadboat-project:

- a) *Designing digital artifacts and activities for methodological and analytical research work.*

Designing video based systems for recording, storing, categorizing and analyzing research material during fieldwork process is of central interest. A goal for this design work is to assist the boatbuilder-researcher in adapting technical and professional systems and standards to document his work. The digital video material needs to be categorised according to the semantic based ISO-standard, CIDOC CRM (Conceptual Reference Model) made for description of museum objects. This is necessary as the documentation material from the Gokstadboat project will be stored in official archives for cultural-historical research. Since the digital research material from the Gokstad project mainly focuses on building processes, and not on objects, adjustments to the CIDOC-standard is needed to include research material that is based on narratives and process documentation.



Fig. 2. Video of the researcher explaining an interpretation of the shape of the second plank from the keel, with the 1:5 paper model to the left, and the fragments from the dig to the right. Also visible is the AVID digital video tool used to add metadata (making the clips searchable and relatable to others).

Another example of the design work is the design of new routines for fieldwork, such as storing the digital video material in MPEG-formats while in the field. The design work therefore needs an understanding of the role of digital media for the

researcher's own understanding and analysis. Having worked on other participatory design projects with a mix of media and information systems in an emergent, experimental and developmental framework, we see the collaboration with the boatbuilder-researcher as posing specific and interesting design demands. Our role is to assist the ethnologist in his dual work in crafting an actual boat and in critically reflecting on the reconstruction of a cultural-historical artifact.

b) *Designing the digital research narrative of the Gokstadboat project.*

The designers are accountable for the adjustment of the digital material for the mediation of the Gokstadboat-project, both as a digital, netbased research exhibition and as a resource for lectures and presentations at the university and in public. This focus on digital research narrative represents the second level of RENAME. The design focuses on use of video in multimedia platforms. Understanding how the researcher is able to use the digital video material and the digital editing tools for mediating his research process is of central interest. Here use of open source tools for content management, as such as Apache Lenya, will be studied as an appropriate tool for flexible and multimedia-based research mediation.

c) *Designing research mediation for online and off-line learning in museums exhibition.*

RENAME is based on the idea that gathering digital research material also allows possibilities for re-use of material in interactive, and public multimedia exhibitions,. Multimedia offers new capabilities for communicating knowledge in museums (Hunter 2002), and new opportunities for designing learning connected to exhibitions. This is a strand to be developed further from the project.

Designing video based artifacts for analysis and mediation

Video documentation has been used to create resources for analysis, reflection, and mediation upon the three levels mentioned above. Potential values of video documentation may be summarised as follows:

- video recording creates permanent primary records as resources that can be shared as 'springboards for discussion' between researchers and practitioners whose activities are recorded, facilitating reflective review by both multidisciplinary researchers and practitioners;
- repeated viewing can reveal antecedents, patterns that emerge over time, and phenomena which were at first invisible to participants and researchers;

- audiovisual records can help to counteract biases of field notes and other methods which rely on reconstruction of events by researchers;
- by approximating direct observations, video provides a shared resource to overcome gaps between what people 'say' and what they 'do'; and,
- video can be used to 'map' collaborative but temporally and spatially distributed activities among members of teams, making it possible to go beyond what any individual can see and perceive in and from a given moment, location and perspective (SmørDAL & Gregory, 2003; Suchman & Trigg, 1991).

Our theoretical design approach: negotiation & development

The design of digital media that supports an emerging, digitally-based research process needs to be supported by a second-order understanding (Krippendorf 1995) of the researcher's activities and goals. The design process also has to be built on a mutual learning process (Bjerknes, Bratteteig, Kaasbøll, Sannes & Sinding-Larsen 1985) between researcher and designers, where both parties in the design process learn from each other and individually.

In this process a conceptual framework is needed for establishing relationships and alignments of all the standards, systems, platforms, activities, knowledges, actors and goals. We now present concepts from actor network theory (ANT) (Callon 1991; Latour 1991; Latour 1999a; Latour 1999b; Law og Hassard 1999) and activity theory (AT) (Vygotsky 1978; Leontjev 1983; Engeström 1987), two theoretical frameworks usually used for studies of the relation between technical artifacts and human beings. ANT and AT have much in common as they both attempt to transcend the dualism between subject and object, nature and society (Miettinen 1999). The frameworks are also relevant for two levels of the design work and process: the process of *negotiation* and the process of *development*. This makes a combination of concepts from the two frameworks relevant for the planning, execution and understanding of a design process.

Actor network theory is known for its symmetrical understanding of human and non-human actors in socio-technical networks in which (e.g. Pinch & Bijker 1987) technology can have the role as actors as well as human beings. This mutual, deterministic understanding of the technical and the social can be valuable in understanding the way the technical artifacts are involved in knowledge production

and mediation processes. We propose the several ANT concepts as design concepts because they are relevant for the diverse aspects of the negotiation process.

Actors and intermediaries describe two different roles of entities in networks, active and passive. The concept of intermediaries is borrowed from economics, where it describes how a relationship between a consumer and a producer is shaped by a product, an intermediary (Callon 1991). Interaction involves the circulation of intermediaries. The concept of actors is borrowed from sociology, where actors are defined in terms of their relationships. ANT fits together the two understandings, which makes “actors define one another in interaction – in the intermediaries that they put into circulation” (Callon 1991:135).

Alignment describes the processes of generating a shared understanding or a common goal and can be the measurement of the convergence of different knowledge, actors and intermediaries in a design process. The negotiation is the process of aligning the heterogeneous actors understanding of their roles and goals in the design.

Inscription aims at describing how a sender builds in premises for receivers’ understanding in the message, or in the design. Designers define actors with tastes, motives, competences: “A large part of the work of innovators is that of ‘inscribing’ this vision of (or prediction about) the world in the technical content of the new object.” (Akrich 1992:208). For us, in many ways the negotiation in a design process is about aligning heterogeneous visions and predictions before inscribing them into the new design (Stuedahl 2004).

Activity theory addresses human *activity*, where activities constitute a social and collaborative context mediated by socially designed artifacts, such as tools, languages, and rules (Vygotsky 1978; Leontjev 1983). The mediating artifacts may be internal, directed to the activity itself, orienting human conduct toward the object of the activity (c.f. signs), or external, making changes to the object of the activity (c.f. tools). Activity theory has been used to inform design methods (Díaz-Kommonen 2002) and to conduct structural analysis of the design activities (Korpela, Mursu & Soriyan 2001).

Current activity theory seeks to combine actor network theory’s emphasis on the development of networks and the power of infrastructures with activity theory’s

emphasis on artifactual mediation and development of activities and social practices in cultural-historical contexts (Miettinen, 1998; Bratteteig & Gregory, 1999; Miettinen, 1999). Combining theoretical concepts can be helpful in analyzing interrelated networks, heterogeneity, boundary crossings and contradictions. Through such combinations, it appears that such theoretical work can also inform design frameworks.

Using these concepts and theoretical influences we are building a design process based on participation and collaboration. The concepts from activity theory help us to analyse the mediation of the digital artifacts used in the research, and the subsequent development of knowledge of how the Vikings might have built their ships and boats. Understanding how the researcher's analytical understanding is related to his use of the designed artifacts is central to our project. While at the same time as understanding the negotiation he is involved in during the participatory design project, the way he inscribes the design of routines, artifacts and systems together with the designers is also of overall importance for understanding knowledge building.

Discussion

The actor network approach and activity theory provide an openness for understanding heterogeneity in activities and among actors. This makes them relevant for the planning of design approaches and methods in design projects which integrate many voices and knowledges. Instead of looking for a common ground for the design work, we propose discussing metastructures of cultural-historical nature and structures of negotiations so as to inform operationalisation of design in heterogeneous contexts and with heterogeneous knowledges. In this way, the knowledge building of design can be based on an ontological openness.

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