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T-shaped craft researchers' contribution in transdisciplinary research projects

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Abstract

Transdisciplinary project groups are promoted as a way for coping with the growing complexity of research environments. In the context of archaeology and conservation, the knowhow of practitioner-researchers in crafts has potential in supporting the reconstruction of past events as well as the material and technical background factors. As education in the arts and crafts have gradually moved from the workshops into academic institutions, artisans enter higher education and can pursue research careers. In cases where an artisan with longitudinal craft experience conducts research training in a related area, such as archaeology or conservation, we can speak of T-shaped practitioners. In this article, we will present three examples of research conducted by Scandinavian practitioner-researchers who are professional crafts practitioners in wood, but also archaeologists / conservators. We discuss the potentials of practitioner-researchers in craft for facilitating experiential knowledge transfer between project members of different disciplines.

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Introduction

Whether an artefact is new or old, and whether the maker is contemporary or not, there are certain material and technical logics that form the backdrop of any craft practice, and that leave traces in the artefact. The ability to read these traces has been described as a code competence (Almevik, 2017; Almevik & Melin, 2015, 2016; Høgseth, 2013; Källbom, 2022:109; Melin, 2017b) or traceology (Blàha 2013). Code competence may be acquired by anyone who is in a longitudinal and close contact with similar processes, preferably through transformational learning from within the practice (Ingold, 2013), but it also requires theoretical study of the subject area (Godal, 1996).

Naturally material resources and qualities change over time, traditions come and go, and even within traditions each generation makes changes in material use and techniques (Gandon et al., 2020; Melin, 2022). Additionally, regardless of tradition, time or material context, every making situation is a unique, situated, embodied and reflexive practice in which the maker is negotiating holistically with the situation at hand and in relation to emerging needs and varying resources (Naji and Douny, 2009). When it comes to very old artefacts, it will never be possible to answer those questions with certainty based on the artefact alone. However, artisans have often been used as informants when trying to investigate and back track the making processes of artefacts from past times.

Oftentimes artisans' statements are collected by researchers, who then combine the information with knowledge of other domains (e.g., archaeology) that creates a larger and more comprehensive understanding of the artefact and the possible materials and making processes. In many such research projects these, often anonymous, artisans' opinions are not valid in themselves, but their accounts are validated via the selection and interpretation of the informed researcher (Botwid, 2022). When the artisans account is made into data and analysed in the context of previous research and theory it becomes trustworthy and is delivered by the researcher.

Is there a risk that the information is used in a one way direction if the artisan is not participating in the analysis? And is there a risk the artisans' interpretation is misleading as their modern tradition is used as a norm to evaluate the artefacts against? In some cases archaeologists, anthropologists or conservators embark on a craft apprenticeship to gain a better and deeper insider's understanding of a practice themselves (cf. Coy, 1989; Gowlland, 2015; Marchand, 2015, 2016). Marchand (2015: 221) acknowledges the necessity of studying 'with' the subject, in this case contemporary artisans: 'In order to optimise the "productive" potential of such exchanges, the shift from "studies of" ethnographic subjects toward collaborative "studies with" communities of practice will become increasingly necessary'.

Similarly, Gowlland, (2015: 296) writes: 'Apprenticeship as method represents a unique way of providing a first-hand account of experiences of work. One must of course be cautious about assuming that one's experiences of learning the craft are the same as one's informants'. Gowlland acknowledges that the perspective of the

ethnographer studying crafts through a temporary apprenticeship differs from craft practitioner's longitudinal knowhow. How about artisans embarking on research careers in anthropology, architecture or conservation? There is now a new generation of practitioner-researchers in crafts who embody deep material and technological skills and craft knowledge, but who are also trained in the anthropological or historical backgrounds of these domains. Should these craft researchers' voices be heard?

The field of craft sciences (cf. Westerlund et al., 2022) has evolved as a result of the academisation of craft practices in the Nordic countries. In this article, we present three cases of craft science investigations in historic woodwork. We start with introducing the craft science field, presenting the mainly scandinavian research landscape that we draw on in this article. We also present the idea of T-shaped practitioners, derived from design research but adopted in several domains. We show how parts of the craft sciences are related to more anglophone research, especially within experimental archaeology. We then present and discuss our three examples of craft science studies in archaeology and conservation and discuss how these were informed. We particularly point at the opportunities, but also challenges, of transdisciplinary work and the potential role of T-shaped practitioner-researchers as bridging knowledge transfer related to craft practice in such projects.

Craft sciences

The Craft sciences ('Hantverksvetenskap' in Swedish and 'Käsityötiede' in Finnish) is an established research field that brings together various craft practices and educational craft contexts with the aim of building a rigorous academic knowledge base in the more general field of *Crafts*. In the Nordic languages, *science* refers to the wider concept of '*Vetenskap*' or '*Wissenschaft*' in German. This is a broader term than the English word 'science' that does not only relate to the hard natural sciences but also includes subjects within the humanities and social sciences such as the arts, music, sports, literature, anthropology or history (Almevik et al., 2022a: 3). Within this knowledge tradition, there are also synonyms to 'knowing' that make differences between knowing *that* and knowing *how* just as Ryle (1971) identified, pointing to the different nature of explicit declarative and implicit procedural knowing – the latter being connected with tacit manual labour such as crafts.

In the early 1990s, craft teacher educators and craft researchers in Finland established craft research practices on university level with the first professor of Craft sciences (cf. Kokko et al., 2020). Craft science in heritage studies, that is the topic of this article, is mainly developed in the Scandinavian region and closely linked to vocational craft practices including f ex carpentry, building conservation, masonry, blacksmithing, agricultural and gardening crafts, as well as culinary crafts. Students in cultural heritage and conservation, in Sweden called the field of Kulturvård (directly translated as 'culture + care'), study how previous generations have handled raw materials, natural resources and tools, for example, through making and cultivating the cultural landscapes and gardens by combining traditional craft knowledge with the study of physical remains and historical documentation (Almevik et al., 2022a:10; Wetterberg, 2021). Craft skills and material knowhow are part and parcel of knowing how to care for, handle, restore

and maintain material culture, thus Ba and Ma students in Kulturvård must also learn traditional craft skills (Almevik et al., 2022a:11).

In the craft science research conducted at Department of Conservation at Gothenburg University, Mariestad, and at the related Craft laboratory in Sweden, there is a focus on the practitioner-researcher who embodies experiential knowledge of the practices under study (cf. Almevik, 2012; Eriksson, 2019; Hjort Lassen, 2014; Jarefjäll, 2016; Jarefjäll et al., 2017; Källbom, 2022; Leijonhufvud, 2022a; Leijonhufvud, 2022b; Seiler, 2020; Westerlund, 2017). Often researchers in Craft science already have a longitudinal experience of being professional craft practitioners before embarking on research careers at a mature age.

Craft-related practitioner-researchers in cultural heritage and material culture studies have the additional challenge of also considering the *temporal dimensions* in their research. This challenge invites the practitioner to consider expanding into other domains to discover more perspectives of one's own craft knowledge. Hence, there is a 'new breed' of craft researchers who combine their deep and experiential knowhow of a craft practice with the study of, for example, Archaeology or Conservation. Such a combinatory knowledge structure may be called T-shaped.

Practitioner-researchers with a T-shaped knowledge base. In this article, we will borrow the concept of T-shaped practitioners (Figure 1) from the field of design research to explain what is meant with this type of knowledge structure (cf. Barile et al., 2012; Madhavan and Grover, 1998).

The concept of T-shaped skills, or the T-shaped persons 'vertical stroke' in this article can be described by the practitioner-researcher's expertise in their specific craft domain,

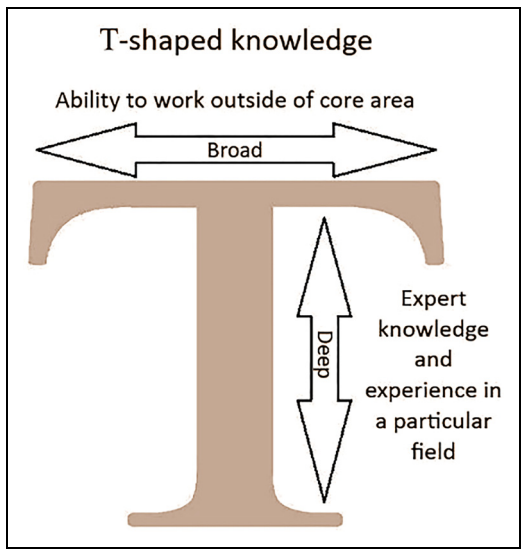


Figure 1. Visualisation of T-shaped knowledge by the authors.

such as carpentry or boatbuilding. The 'horizontal top line' of the T represents the additional transversal experience and their ability to relate to and collaborate across disciplines with other experts, in our case archaeology and conservation. The concept of the T-shaped practitioner has evolved to include also more 'legs' introducing the A, π, M or gamma- (for programming skills) shaped practitioner (Schmidt and Marwick, 2020), all with additional skills and overlaps of knowledge. Also the academic skills that come with research training could be included here.

Research through practice and multiple expertise

Multiple expertise is getting more common, for example, ceramist and archaeologist PhD Katarina Botwid (Botwid, 2022) combines her skills through auto-ethnographic studies, calling this the *Artesanal* perspective. This type of craft research that contributes to archaeology takes us into the realm and methods of experimental archaeology. There are several researchers in for example ceramics working with experimental methods in ceramics, (See the CNRS team led by Valentine Roux or the EXARC Network) – some of whom have differing degrees of personal experiences of the crafts techniques they are studying.

When expert potters are used as participants in a study, their voices are seldom heard regarding their expert knowledge (Botwid, 2022; Gandon and Roux, 2019). For example, Jeffra (2008) writes that experiential archaeologists are good at answering questions such as who, what, where, when and how but not so good at answering questions on why – an aspect that experienced craft practitioner-researchers may shed some light on? Indeed, Forte (2019:7) writes that 'a better comprehension of the expertise behind a production can be obtained by researchers who develop their own personal experience in terms of skill, time and technical difficulties'. Even if several researchers in this field have experience in pottery, few researchers draw openly on their own intuition, experiences or auto-ethnographic accounts in their research outputs – likely due to the limitations of the credibility of subjective evaluations (Lammers-Keijsers, 2005).

With the Material Turn in archaeology, the concern with crafts has become pronounced, posing questions on quality, skill and technique. Crafts have been a focus especially in ethnoarchaeology (David and Kramer 2001; Stiles, 1977; Wendrich, 1999; Renfrew and Bahn, 2000: 178), trying to grasp the processes behind artefacts, on the one hand in studying living traditions, on the other hand in trying to reconstruct forgotten ones. Cognitive Archaeology has further pointed to the role artefacts have had in the cognitive life of humans, connecting artisan's skilled workmanship and making to cognition (Malafouris, 2013). Experimental archaeologist Outram (2008) has pointed at the importance of collaboration between different specialists, both academics and practitioners. Similarly, in his thesis on Bronze Age metalworking Kuijpers (2018) acknowledged the embodied knowledge of professional craftspeople for a fuller understanding of the objects, their production and the levels of skills involved (see also Schenck, 2015; Pijpers 2017).

Archaeologist Reynolds (1999) has developed a methodology in which hypotheses about reconstruction in experimental archaeology are considered as construction experiments. *Interpreted* reconstruction experiments, on the other hand, are considered

simulation experiments (Mathieu, 2002; Reynolds, 1999: 156–162). Further, Outram (2008: 1–5) highlights the importance of experiments in real situations and environments as opposed to experiments in artificially constructed laboratories). Experimental archaeology is thus not only about research into artefacts but its aim is to find out more about the people behind these artefacts (Comis, 2010; Evis, 2016; Lammers-Keijsers, 2005; Mathieu, 2002; Paardekooper, 2013).

Shared interests in craft knowledge

This demonstrates how archaeologists (and other practitioners) integrate craft knowledge into their research to different degrees, but also highlights the role of the artisan. Building conservator and restoration architect Almevik and Sjömar (Almevik 2012:31f; Sjömar, 1999) have promoted the engagement of artisans as equal producers of knowledge in investigations and restorations. Høgseth has underlined the similarities between the carrier of craft tradition (the artisan) and the building archaeologist as producers of knowledge within buildings conservation and concluded that it is natural that they should collaborate, as they both are practitioners with similar interests (Høgseth, 2007; Botwid, 2022).

What these orientations in archaeology, conservation and craft sciences have in common is that they deconstruct and reconstruct events using physical source material (Almevik, 2017: 237–261; Hurcombe, 2007; Høgseth, 2007; Kuijpers, 2018; Melin, 2017a, 2017b; Outram, 2008). Like the practitioner-researcher, also the archaeologist examines and analyses the physical object in an embodied and experiential way, making subjective sensory evaluations that inform the research (Høgseth, 2007; Hurcombe, 2007; Pijpers, 2017; Skeates and Day, 2020).

Three examples of practitioner-researcher's perspectives in craft research

In the three cases described in this article, T-shaped practitioner-researchers, who are also co-authors of this article, describe in first person how they utilise their experiential knowledge in the tracing of past workmanship. By doing so we analyse the way that these practitioner-researchers contributed to knowledge in their respective research projects.

Example 1: Harald Bentz Høgseth, enactment of craft movements

I started as an artisan crafts practitioner working with carpentry and traditional craft techniques and methods – and later studied for a doctorate in archaeology with specialisation in craft. The skills and understanding gained through my craft practice, also benefited my role as an archaeologist. Similarly, my training as an archaeologist developed my ability to document, interpret and to reflect on my practice. These experiences have been important for me in the last 25 years as I have collaborated with both artisans and archaeologists.

In this case example, from the Nidaros Cathedral's excavation in Trondheim, Norway (Figure 2a), the aim was to develop a better way to document archaeological tool marks

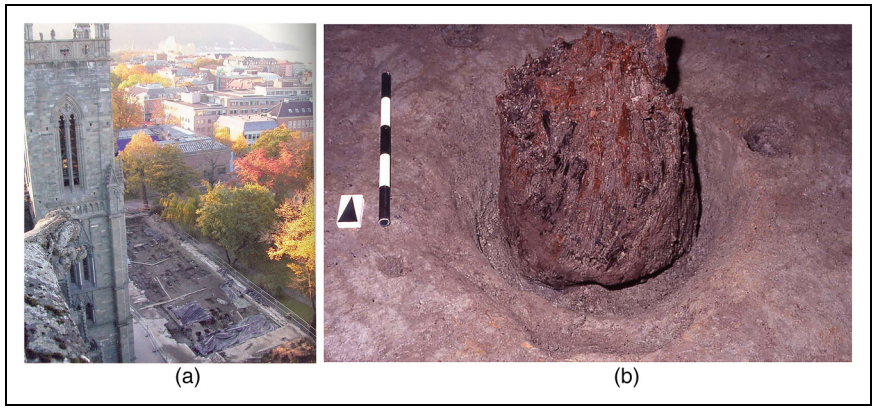


Figure 2. (a and b) To the left is an overview of the excavation area at Nidaros Cathedral in Norway, 2005–2006. To the right is an example of the remains of a wooden building on the same excavation field. Images by Høgseth previously published in 2007: 231.

on the surface of wooden building remains and develop procedures for analysing the working process and 'know how' behind them (Figure 2b). Later, it became important to build a bridge between such tacit knowledge and more explicit academic knowledge for preserving and further developing craft knowledge. I'm particularly interested in the perception and the 'know how' behind tool marks related to traditional craft techniques. Tool marks represent definitive parts of the carpenter's knowledge and may give us important information about the connection between the artisan, the materials, tools and their working process (Blàha, 2013; Høgseth, 2007).

This study mainly focused on three approaches: Firstly to identify, document and analyse tool marks, then to deconstruct and reconstruct the connection between a series of tool marks and connect them to the craftsperson's body techniques, the dynamics, rhythm and movement pattern behind the tool and the connection to the material. And, finally to translate the action behind the movements and the techniques into an academic format (Høgseth, 2013).

An interdisciplinary team, including a contemporary artisan, myself and a dance pedagogue were involved in the two first approaches of the project. They participated in identifying, documenting and in analysing tool marks through deconstruction and reconstruction. As a carpenter and archaeologist, I was involved in all stages of the investigation (for an overview of the project see Høgseth, 2007).

This project group, owning T-shaped competences and overlapping expertise, developed methods for analysing the dynamics of the rhythm and movement patterns behind the working procedures that shaped the tool marks in the surface of archaeological timbers (Figure 3a-f). In addition, we had the opportunity to go deep into the artisan's bodily perception through enacting those movements ourselves.

The form and dimension of the tool mark and the quality of the material tells us something about the artisan's processes and possibly also the reasoning and decision making

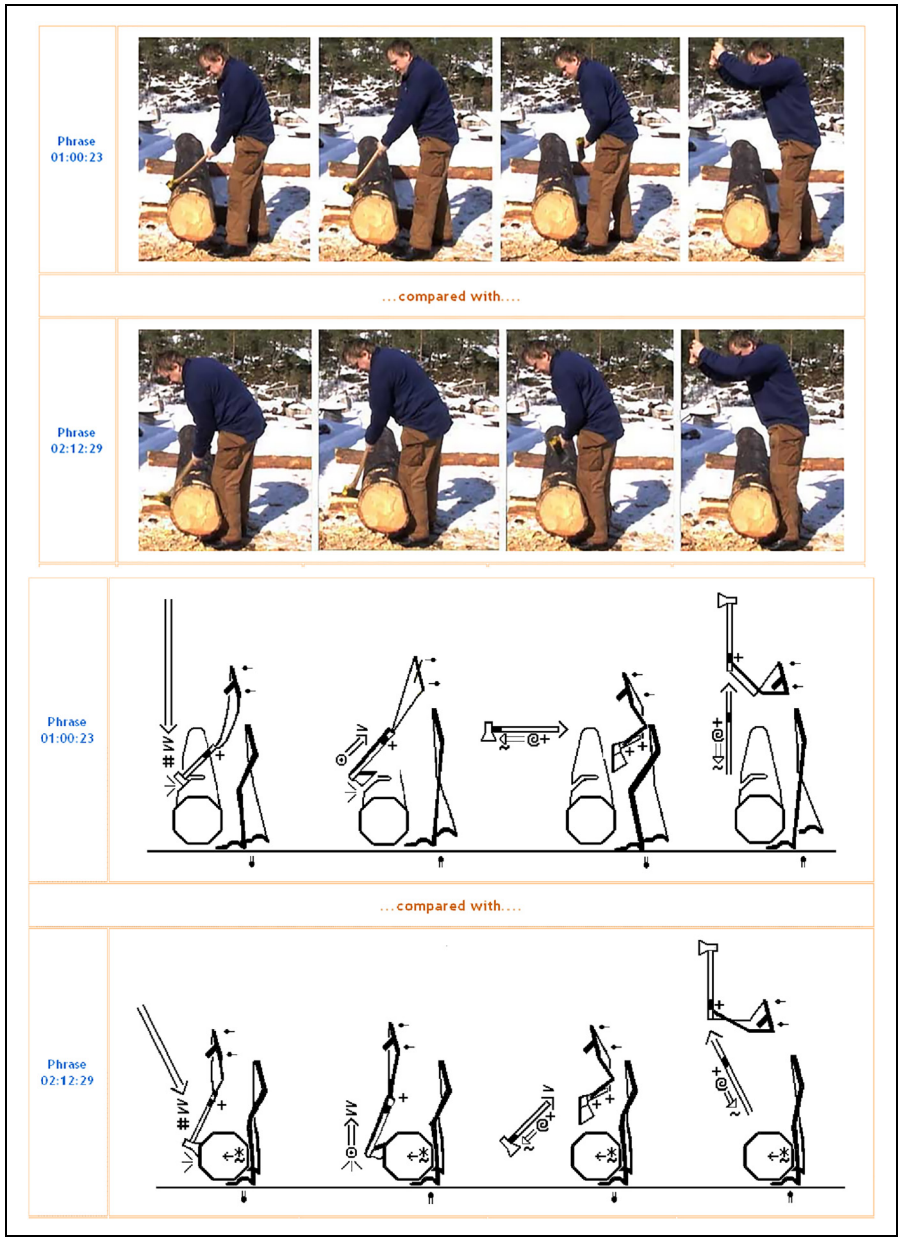
Figure 3. Upper photo to the left; conservator works with silicone castings, in the middle; archaeologist / carpenter and conservator studies negative castings and upper photo to the right reveals plaster casting with tool tracks. The lower photo to the left shows practical experiments trying out different traditional techniques with different axes, and the last photo is of the original wooden artefact. Images by Høgseth, previously published in 2007).

behind these. However, to be able to decode this information it is necessary to understand the artisans' perceptions, movements and actions related to space, time, tools and the material.

The notation system helps communicating knowledge between disciplines

We developed a methodology for mapping the artisan's actions, movements and rhythm in collaboration with the dance movement notation developer, pedagogue and former dancer (Sutton (1973; 2014). The notation tool enables us to analyse the artisan's perception and the relation between the artisan, environment, tool and the material context (Figure 4–5).

Dance and music making are artforms that are deeply related to the performer's actions and perceptions. Both domains have developed notation systems which make it possible to describe the relation between movements and sounds; this happens through written and



Figures 4-5. The artisan's rhythm and movement pattern can be compared to the dancer's, but here it is the relationship between body, tools, material and environment that controls the procedure, rhythm and workflow. Images by Høgseth previously published in 2007, 233–237.

pictorial choreography and musical notes. These symbols contain a three-dimensional meaning that is immediately understood by the practitioners that perform the actions, and in addition, the competent observer. Artisans can be examined in the same way. The processes and actions of the practice, and the result in tool marks, all can be notated. To make different stakeholders in the collaborative research team able to communicate better, this notation system seemed fruitful.

Sometimes there might be tensions in a research group depending on the different cultural and contextual traditions in ways of communicating and use of language and habitus. Since I'm an artisan myself, I have the advantage of being able to communicate with the other experts regardless of their contextual backgrounds; I have a common understanding with other craft practitioners and can thus communicate on a deeper level with them within a shared understanding of the craft knowledge, and the same goes with my archaeology colleagues. My expertise as both an artisan and archaeologist also affect the way the questions are asked in the team, the methods we choose or develop and the way we investigate through them. Aligned along with the way, we examined the situation in a non-judgmental, scientific but empathic way, where care and mutual respect, dialogue and appreciation dominated the research.

Example 2: Kalle Melin, analysing built wood constructions

I'm a carpenter and doctoral candidate at the University of Gothenburg, Department of Conservation. I have also studied prehistoric archaeology and worked as an archaeologist. In my ongoing doctoral study, I focus on carpentry art from the twelfth century in the diocese of Lund. The primary sources I use are twelfth century wooden constructions, tool marks, illustrations and written descriptions. I consider these sources as reflecting the 'truth'. On the other hand, I consider my own craft knowledge and the tradition I learnt as a secondary source and as such 'false' until proven otherwise. I wish to understand mediaeval craft from perspectives contemporary with the craft and the artefacts produced at the time (Melin, 2022).

I have been involved in the *Södra Råda* mediaeval wooden church reconstruction project since 2007. In this project, craft researchers, carpenters, historians, dendrochronologists and stakeholders collaborate in interdisciplinary investigations and full-scale experiments. The reconstructed building was not the main goal of the project, but rather an extra bonus that can be used for future experiments in craft, liturgy, conservation and as a valuable pedagogical attraction. Rather, the main aim has been to reconstruct fourteenth century carpentry timber techniques in order to gain knowledge that can be used to understand, preserve and maintain other extant mediaeval wooden constructions.

In the beginning of the project, we interpreted the historic sources and the remains of this burned down church from our modern perspectives and ideas of our craft and its logic. Some documented original details did not make sense to us at first, such as the leaning gables and seemingly 'poorly' made corner joints. These we explained as deformations of age or poor craftsmanship. When the practical reconstruction began, we mainly used traditional carpentry techniques to make a copy of the lost building, but as the project ran over several years, our methods and aims evolved. We started to question our own traditional methods in favour of the understanding gained from the primary

sources – we stopped copying and instead researched the possible reasons behind the design decisions and the craft practices that might have been valid in the fourteenth century (Melin, 2017b). The leaning gables could be reinterpreted as conscious and deliberate designs, and the corner joints were probably made well enough according to contemporary norms of that time.

I also became more aware that craft techniques, material and design decisions are not solely dependent on the individual artisans. Craft and craft techniques do not exist in a vacuum but are related to the contemporary context of available material, economic resources and systems, demands from the patrons and the existing zeitgeist. In many situations, these factors were more important for the result than the opinion and craft knowledge of the involved craftspersons (Melin, 2022). Things that at the time were out of control for the artisan, together with different craft traditions often resulted in decisions that from modern perspectives seem illogical or even deemed as not very skilled.

I have additionally been the project leader of the Diocese project *Historic carpentry art in the Diocese of Lund*, 2014–2022. The purpose with this project was to make an inventory, document, protect and share knowledge about the mediaeval wooden constructions in the 283 still extant mediaeval churches in the Diocese of Lund. These churches are in a continuous need of maintenance and repair, which leads to interventions with the mediaeval roof constructions and also the 'waste' and dust accumulated in the attics over hundreds of years, as it contains valuable information about the history of the building and the society.

Figure 6. Documentation of 12th century roof truss embedded in the chancels gable and archaeological cleaning of Tåstarp church in collaboration with the archeologists from the museum Kulturen in Lund. Photo by the authors.

Figure 7. Sifting of materials from the Farhult church attic. Photo by the authors.

Already in the 1970s building archaeologist Barbro Sundnér (personal communication, 2012) tried to get the layers of organic material in church attics to be classed as cultural layers (Figures 6 and 7). The National Heritage board did not agree to this since the buildings were in use. Therefore, many church attics have been cleaned using large vacuum cleaners, and it is not even possible to calculate the amount of valuable information that has been lost due to this practice in the last decades. However, in the Diocese project, I had the opportunity to participate in attic cleanings, sampling the dust before an archaeological cleaning was done. I visited the church and made a craft scientific evaluation of the roof trusses and the cultural layers. In some attics, the cultural layers act as a protection for vulnerable wall paintings that need conservation and interdisciplinary treatment before or during the removal of the organic layers. In cases like this, I worked together with conservators, heritage officers, carpenters, bricklayers, archaeobotanists and not to forget, the parishes and their co-workers.

During restoration and reconstruction work, as in the *Södra Råda* project, the knowledge of how the waste material from different woodworking techniques appeared has evolved. This is of great advantage when interpreting wooden waste from building activities found in the attics. In Norderö church and Tensta church, small wooden waste particles could answer which type of auger that was used to make dowel holes on the rafters and further give information about the building process of the roof trusses (Sjömar, 1999). Without the residues from the drilling and knowledge about the craft procedures, this information would have been lost.

Figure 8. Dendrochronologist Hans Linderson from the University of Lund samples a roof construction. Photo by the authors.

I also collaborate with building archaeologists and a dendrochronologist in researching church roof constructions in cases when an archaeological cleaning is not possible. In such situations, a craft scientific investigation starts with a general overview of the roof construction and questions and hypotheses about the age and whether the timbers were *in situ* or reused are established. In Sweden, it is necessary to apply for permission to take dendrochronological samples on mediaeval roof trusses (Figure 8). During archaeological cleaning, it is common to find building debris and offcuts, from earlier repair work or even from the building phase, these can be analysed without making any invasive sampling on the constructions. The hypotheses and questions we produce are vital for the

decision if we will ask for permission from the authorities to take dendrochronological samples.

When this is the case, we choose sampling points carefully and examine them with a raking light to be sure that we do not harm any carpentry marks, graffiti or other traces of special interest. When using a raking light I have found almost invisible runes and geometric sketches made by the builders in the twelfth century but also tool marks that give valuable information of the used tools and techniques. After the dendrochronological sampling is conducted the analysis can focus more on verifying or rejecting the ocular dating and answering questions about provenance and silviculture that can't be answered using only craft scientific methods.

Another positive effect is the deeper understanding about used qualities of timber and silviculture that can be gained by this collaboration (Edvardsson et al., 2021). When this interdisciplinary research is triangulated with mediaeval written accounts and archaeological research an even more holistic interpretation can be made, as in the case of Norra Åsums church from 1185 where the past craft can be put in a context of declining availability of certain oak qualities, conflicts in the competition for the natural resources and civil war (Melin, 2022).

The examples show that interdisciplinary collaboration might answer many questions. But is it possible to understand past craft from perspectives valid when the craft was performed as my aim is? When I perform craft research, documentation and experiments, I see myself as an apprentice learning from the primary sources and not as a master judging them. In several experiments in craft, I had to go against my preconceptions and craft intuition in order to follow the clues from the primary sources. Many times, I failed and had to redo the experiments after reconsulting the sources. Other times the method of acting as an apprentice was successful and the reconstructed methods resulted in similar results as seen on the original constructions, but still made in opposition with existing traditions and explanatory models (Melin, 2017b). Other ways of reducing the risk of wrong conclusions are to combine several sources; to zoom in and out at constructions and details, to study as many constructions as possible in a region of the same age in order to see what solutions and details that are common or rare, to study other regions constructions to get hold of what is specific for the region under research.

The major advantages in being a T-shaped craft researcher are the ability to easily change perspective, and be able to evaluate, and be critical of sources, both about theory and practice. But it is also an important skill to be able to make oneself understood to members of different disciplines involved, and hence be able to work for a better result in conservation, documentation and research. In interdisciplinary projects, as the ones I have described, I see myself as being able to bridge the knowledge transfer between the team members.

Example 3: Fredrik Leijonhufvud, eyeing the shape of the boat

I'm a boat builder specialising in restoration and replica building of historic boats and ships. I also have a bachelor's degree in history and a master's degree in conservation. In my work as a teacher of wooden boat building, I have mainly worked within the Nordic boat building tradition that originates from the Viking ages (Hasslöf, 1988).

Documentation and reconstructions of old boats have been a vital part of my work, and as I now study for my PhD in conservation I utilise this knowledge base in the study of historic clinker boat building.

Every traditional boat builder develops an ability to create an abstraction of the boat's shape and an understanding of how the boat will perform in the water. The boat builder also develops an intuitive ability to determine the right dimensions of a boat's construction based on the logic of the boat's intended performance. These skills are learned from the master boat builders but are also acquired from building experience and studying boats built by other boat builders in past and present times. If a detail of a boat is presented to an experienced boat builder, they can approximate the size of the rest of the boat, by the eye, without tables or mathematical calculations. The training to become a boat builder involves embodied knowledge, and during which the boat builders must learn to trust and use their senses, such as visual estimations and abstract perceptions of shape. These skills can be used to analyse and interpret boats from the past as well.

In 2022, I participated in a fruitful collaboration between archaeologists and boat builders in the annual 'Råseilseminar' (Square sail seminar) organised by the Norwegian NGO maritime association 'Kysten' (see also https://batbyggarkonst.se/paraseilseminar-i-norge/). In this four-day seminar, boat builders, maritime archaeologists, museum professionals and people with sailing experience from viking ship reconstructions and traditional Nordic clinker boats meet. Parallel workshops focus on different aspects of an overarching theme. This year's theme was the possible room for interpretation in the reconstruction of one of the Viking boats in the Oslo Viking ship hall, the boat find called G1 or Gokstad 1 (Brink and Price, 2008).

The workshop I participated in discussed the possible and probable interpretations for the reconstruction of the hulls shape, based on the preserved material. In the group, there were people with extensive experience in sailing and building traditional clinker-built boats but also marine archaeologists specialised in research of Viking Age boats. This was a very rewarding workshop, where the various skills could be put to good use, for example, when it comes to knowledge of wood's properties and affordances, partly from the boat builder's perspective, but also with archaeological and dendrochronological expert knowledge of how archaeological wood can shrink and deform throughout centuries.

In this workshop, there were boat builders knowledgeable in different local variations of Nordic clinker boat traditions, but in spite of this, we usually agreed in our assessments about what a reasonable reconstruction should look like, given the preserved wood and the sailing waters for which the original boat was intended. In some cases, it is interesting to see how marine archaeologists and boat-builders can reach conclusions on the same artefact that differ very much from each other and would have benefited from mutual discussions. In these cases, both perspectives would be fruitful for a holistic interpretation of the artefact.

An example of this is marine archaeologist Eriksson's (2010) interesting analysis of mixed carvel and clinker constructions. Eriksson highlights that this was a sought-after visual effect of the carvel hull and that there could be fiscal reasons for the rebuild from clinker to carvel. These are interesting aspects that I would probably have missed in my analysis. On the other hand, interpretations from my boat-building point of view

Figure 9. Workshop at Forbundet Kysteńs råseilseminar 2022. Boat builders and archaeologists reconstructing the shape of Gokstad G1 archaeological ship find. Photo by the authors.

might serve as a complement to Eriksson's conclusions; when it comes to major rebuilds of large clinker hulls in poor condition, the rational and therefore affordable way to do this is to strip it from the clinker planking and replace it with carvel planking.

Boat builders and shipwrights know that replacement of clinker planking is much more time consuming than replacement of carvel planking, especially in larger boats and ships. This adds a craft-related reason to why clinker ships were rebuilt to carvel. There are also technical differences between carvel and clinker that are more obvious from a craft science perspective. In comparison, a clinker hull is stronger than a carvel hull built with the same dimensions of timber (Figure 9). A clinker hull can therefore be built lighter and cheaper as it requires less material. But if you require a sturdy ship hull that could resist gunshots better, an experienced boat builder knows that it is not possible from a craft perspective to build such heavy and thick ships in clinker technique (Figure 10).

In documentation of boats, that is, in archaeological context *wrecks*, two divergent perspectives appear. The typical archaeological documentation is essentially made *in situ* where the present state of the boat is recorded, with all its decay and wear from usage (Cederlund, 1978; Castro et al., 2018). In contrast, the boat builder's perspective on the documentation is focusing on how the boat looked when it was originally built, often resulting in symmetrical construction plans suited for a reconstruction (Blake,

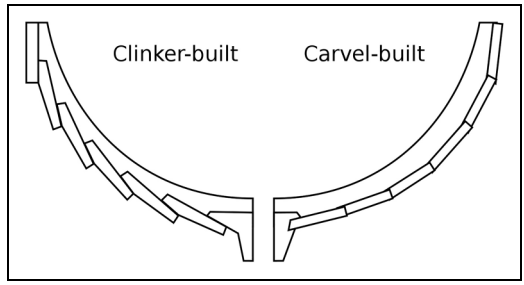


Figure 10. Clinker and carvel. Willhig at English Wikipedia, Public domain, via Wikimedia Commons, Available at: https://commons.wikimedia.org/wiki/File:Clinker-carvel.svg.

1935; Farrer, 1996). As a boat builder, and practitioner-researcher, I also analyse the craft processes of the build and the restorations and alterations of the boat, trying to understand and reconstruct the craft processes of the past (Leijonhufvud 2022a; Leijonhufvud 2022b). I would say that marine archaeologists, boat builders and other practitioner-researchers could benefit from more collaboration, thus enhancing both archaeological research and traditional boat-building skills.

The practitioner-researcher's experiential knowledge

What do we mean with craft knowledge? And what constitutes a sensory evaluation? Experiential knowledge is related to personal and tacit knowledge accumulated through a person's lifetime and is largely implicit (Polanyi, 1966). Generally understood as a way of knowing and meaning making through direct engagement with the environment, experiential knowledge becomes embodied and guides the person in the meeting of new similar situations (Baber, 2021; Malafouris, 2013).This bodily reflection is intuitive and develops over time as the craft practitioner engages with materials, tools and situations over several years. Material interactions require close attention to details in the material properties and related affordances, thus they involve the whole sensory spectrum (Gibson, 1983; Høgseth, 2007; Malafouris and Koukouti, 2022). The artisan also naturally sensitises their senses, thus making more accurate and relevant judgements and decisions (Gowlland, 2015; Groth, 2017).

Expert artisans, may more easily distinguish what actions and materials have been used in other craftsperson's work that is familiar to them. They may even *feel in their bodies* what those actions might have felt like in the process of making as they have 'been there' themselves (Lehmann, 2012: 14; Leijonhufvud, 2022b). This kinaesthetic empathy (Lehmann, 2012:15) or embodied simulation (Gallese, 2019) is not the same as emotional empathy, but rather a kind of bodily mimicking (Gallese, 2019; Lehmann, 2012).

Such ability to relate to others bodily actions also grounds both social and embodied craft learning through apprenticeship in traditional craft practices, where the apprentice is not only socialised into the craft traditions through the community of practitioners and

through the gradual sharing of their value systems, but the skills and habitus of the traditions are deeply engraved into the whole person and physical schema (Høgseth, 2012; Lave and Wenger, 1991). Kinaesthetic empathy evoked by an artefact is an indicator of a familiarity with the procedures that are involved in the making of such artefacts in general, and enactment of these situations may bring forward tacit issues that would not otherwise surface (Almevik et al., 2013; Groth, 2022; Høgseth, 2007; Seiler, 2020).

However, the weight of the artisan's word is judged in another value system than the academic, the scientific rigour against personal and experiential knowledge (Pijpers, 2017). In experimental archaeology, the term *actualistic* is sometimes used instead of the term reconstruction. According to the experimental archaeologist, Tine Schenck, the reason for this is the human factor in the experiment and the potential risk of bias and disturbance of the result (Schenck, 2015: 87). The challenges of leaning on personal knowledge that naturally is subjective are that one might run the risk of leaning towards one's own pre-assumptions and worldviews that might be too narrow as Kalle pointed out in his case example.

While an artisan may be able to make any sort of shapes and artefacts – not all possible shapes are feasible. According to the Swedish carpenter and artist (Tempte, 1982), there is an ethics of craftsmanship in the sense of responsibility, dignity and professional pride. This feeling for what is ethically and economically 'just' lies in making beautiful, harmonious and inexpensive products that should be functional and durable with properly adapted tools and techniques that 'make sense'. The knowledge of the 'economy' of the making process also gives clues to the decisions made by other artisans, as this ethics and the feasibility of materials and actions may sometimes outweigh other types of logics. A practitioner can understand why another practitioner made the choices they made when there could have been alternatives as Fredrik points out in his case example (cf. Gill, 2018).

Situated and embodied knowing

The situated and embodied perspective is an important foundation when examining artefacts. Cognitive archaeologist Malafouris' (2013) material engagement theory is based on the embodied understanding in cognitive science that has broken new ground related to material culture in recent years. In this view, we humans not only think with the things that surround us, and that are a part of our lives – they constitute us and who we are. Similarly the making of artefacts is seen as thinking through materials and tools (Baber, 2021). Craft practice and skilled work, especially in ceramics, figure as examples in this theoretical framework that places reflection in action and material agency in the centre of cognitive processes. An artisan's 'thinging' (Malafouris 2020) in and through materials and tools is presented as a way of making sense of an ever-evolving negotiation with the situation at hand (see also Kimmel and Groth, 2023).

Almost all types of craft practices are path-dependent and thus they follow set procedures that are interdependent (Kimmel and Groth, 2023). While the logic of general actions might stay the same, small changes in aesthetics and patterns give clues to the thinking and special conditions of the artisan during making. These changes may distinguish the individual artisans from each other by differences in toolmarks, left handedness,

mistakes made or aesthetic preference. The situated nature of crafting in a material entails that each making situation is unique, even when producing work conforming to a tradition the artefacts made by hand will never be exact copies.

Even tradition bearers, who aim at carrying on an unbroken tradition, will always leave their own personal imprint on artefacts due to their situated bodily and environmental conditions and limitations (cf. Gandon et al., 2020). An experienced artisan knows that each act of making by hand, even in a production line, is laden with risks and unforeseen events, thus they have also developed brinkmanship and ways of mitigating those risks. Artisans can utilise such mitigations creatively – ad hoc fixing and saving the process is part and parcel of a successful artisan. Artefacts may bear the signs of such creative problem-solving, frustration or even humour and may give clues on the reasons for sudden changes in the craft practice.

This said, traditions, materials and tools have changed over time and a direct 'reading' of an artefact is not possible solely based on our contemporary craft knowledge. We want to point out that the process of reading an artefact from an artisan's perspective, involves the understanding that the original artisan will equally have been skilfully coping with emerging situations as they presented themselves, allowing a field of different possible micro processes to be acted upon (Kimmel and Groth, 2023). It is even more likely that the real contribution of artisans or practitioner-researchers to solving 'making mysteries' is the detection of the *impossible* or *unlikely* choices made by the studied artisan, as they can identify the risks or uneconomical consequences that possible alternative routes would have imposed the original artisan, drawing on the 'logic' of that particular craft practice in their analysis.

Challenges and opportunities in collaborative processes

While we promote artisans and practitioner-researchers' advantage in decoding artefacts via embodied craft experience, this is not to say practitioner-researchers may uncover all possible issues in isolation, collaboration with other researchers is vital to create the larger picture of the events under study.

Having given some examples of what constitutes craft knowledge here above, we acknowledge that a good artisan is not per se a good craft researcher. To become a good craft researcher, it is sometimes also necessary to set aside all personal belief in how a process is supposed to be done, especially judgemental ideas of good versus bad craftsmanship, as seen in Kalle's example. He claims that usually the first hypothesis, when working alone or in collaboration with other craft researchers, is wrong. However, he does not see it as a defeat, but rather enjoys being proven wrong as it is a path to new knowledge. Collaboration is a good way to find flaws in hypotheses at an early stage so they can be adjusted. Informed practitioner-researchers may be able to extract and sieve the more relevant knowledge and particularities that might be hidden in tradition bearers or contemporary artisan's less critical judgements.

While the autoethnographic research method has its challenges as seen above, there are aspects of craft knowledge that are impenetrable for researchers without practical training in the specific craft practices. Since craft knowledge is time consuming to

acquire, not many researchers possess the in-depth experiential knowledge in crafts, as well as historical knowledge about craft traditions and societal developments. By sharing our knowledge, we might discuss our own biases and test the assumptions we have with others. However, this type of sharing of knowledge on equal terms requires that collaborations have a flat structure and that partners are collaborating with mutual respect for each other's disciplines, domain specific expertise and knowledge contribution (Groth et al., 2020; Nimkulrat et al., 2020).

In a dialogical meeting between experts of different disciplines, the different social and contextual backgrounds of researchers and practitioners have the chance to 'cross-contaminate' each other. Such efforts often mean stepping outside one's own comfort zone, but the effort may pay back in a new understanding that brings collaborators closer to the shared worldview. A truly transdisciplinary understanding where collaborating experts transgress their disciplinary borders in the forming of a mutually agreed new understanding – that is based on the merging of perspectives – is rare. However, it is in this space that new breakthroughs are possible (Groth et al., 2020).

On the other hand, *not* collaborating with artisans or practitioner-researchers can even be a risk. as lack of craft knowledge in decision-making processes can have dire consequences for how the remnants are managed and the heritage value they are given in this process (Høgseth 2007: 20–22, 59–69). One example of this is how church attics are cleaned with large hoovers, discarding valuable layers of historical traces as seen in Kalle's example.

Conclusion

Through this contribution, we would like to point out three major benefits of utilising T-shaped crafts people's experiential and domain-specific knowledge in interdisciplinary research teams:

Firstly, we claim that practitioner-researchers in crafts with a T-shaped knowledge structure including archaeology or conservation, have the ability to analyse constructions, toolmarks and procedures from an insiders perspective, that contributes with informed evaluations from a material and craft scientific perspective.

Additionally, we claim that such practitioner-researchers can serve as a 'bridge' between archaeologists, historians, conservators, dendrochronologists (or other material experts) and contemporary artisans (without academic backgrounds) or reconstruction workers in collaborative research and conservation processes. In this way, the fuller picture might be drawn as perspectives meet and the additional information in between the different expertise areas may be better discovered, mediated or understood by different stakeholders.

Finally, we highlight that due to their academic training, practitioner-researchers in crafts are also able to contribute to the academic output of the interdisciplinary research group. Thus, the academic arena gains a more in-depth view of the craft

practices that are under study in this field, including the voice of the artisan who traditionally has been standing outside the academic arena.

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Karl-Magnus Melin is a carpenter / craft researcher and doctoral student at the University of Gothenburg. He is an ICOMOS wood expert and specializes in research and reconstruction of historic craft. He was the project leader for the diocese project Historic carpentry art in the Diocese of Lund 2014-2022 and the restoration of Ingatorp tithe barn 2014-2018 that was awarded with the Europa Nostra Heritage award in 2019. He is currently involved in the Södra Råda reconstruction project since 2007. His research approach is the apprentice's, with an aim to learn instead of judging, and to use the reclaimed knowledge to maintain our heritage.

Fredrik Leijonhufvud is a boat builder/craft researcher and a doctoral student at the University of Gothenburg. He is an experienced teacher of traditional boatbuilding and participated in the successful nomination of Nordic clinker boat traditions to UNESCO's representative list of intangible heritage. His current PhD research project is about reconstruction of craft knowledge within a local 19th century boat building tradition, using a hermeneutic approach on the interpretation of preserved boats and other available, supplementary sources.