A Simple System for the Complicated Cases?

Using Service Design Methods to Visualize Work Practice

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***Abstract*— This paper presents a study of work practice at the Norwegian Agency for Quality Assurance in Education (NOKUT), a Norwegian agency working with recognition of foreign education. Through ethnographic field studies and methods from service design, we explore, analyze and visualize the steps of a digital case handling practice. We show how cases and case handling practice vary in complexity due to different circumstances, and how levels of complexity are not dependent on the type of case handling system used. Further, we discuss how this rich variety of cases would benefit from different levels of digital system support in order to support and not hamper the case handling process.**

Keywords- CSCW; Practice; Ethnography; Service Design; Visualization.

I. INTRODUCTION

Governments and the public sector are continually working on digitalization. Both external public services and internal systems supporting the work performed by employees are being digitalized, resulting in new information technology (IT) systems and work practices. This digitalization is affecting IT systems and government employees across agencies, such as labor and welfare, healthcare, taxes, customs and education [1]-[5].

The Norwegian Agency for Quality Assurance in Education (NOKUT) is currently digitalizing their systems for case handling, an ongoing process since the agency digitalized case handling in 2016. NOKUT is "an independent expert body" under the Ministry of Education and Research. The agency's work consists of accreditation of higher education in Norway, such as universities, university colleges and vocational schools. Additionally, NOKUT works with recognition of foreign education, making it possible for people with education from other countries to apply for recognition of their education in order to work or continue studies in Norway. The digitalized case handling of the Department of Foreign Education is the topic for this paper.

Recognizing foreign education is cooperative work between the NOKUT case handler and an applicant, where the applicant is responsible for providing his or her certificates and diplomas and the case handler for providing and translating documents for assessing the qualifications the applicant claims to have. However, the case handlers' work practice [6] varies considerably, mostly due to the circumstances involved for each application in retrieving documents and assessing education from foreign educational institutions. NOKUT's case handling systems support both workflow and accountability of the case handlers' work as they make the case handlers work and progress visible for colleagues and management [7]. Digital case handling often introduces more standardization and less flexibility for the case handlers, which necessitates negotiations and adaptions to fit the IT system with their use [4].

Investigating and understanding actual work practice as a basis for designing computer support is a central interest for the field of computer supported cooperative work (CSCW) [8]. A work practice is a regularly occurring activity that is constituted by some rules and principles that will be adapted by the practitioner to the circumstances of the actual work situation [6]. Theoretical knowledge and practical work are united in the practice, and the knowledge involved in mastering a practice is what makes it possible to adapt the work to meet the changing circumstances in the actual work situation [6].

Digital interaction between case handlers and applicants/citizens is a topic for CSCW and related research fields [2][9]-[12]. Service design [13] offers a perspective for understanding case handling as a service and provides methods for describing the service as a customer journey. Such journeys traditionally focus on the citizen as the customer, using customer journey mapping to improve public services [14], both by mapping actual experience journeys, and by visualizing an ideal interaction with services [15]. Journey mapping can also be used to visualize other processes, such as case handling, which is the focus in this paper. Case handlers are not customers in a traditional sense. However, they are users of IT systems developed to support their work practices, and their processes are important for understanding case handling practice.

This paper reports from a study of the case handling processes for digital applications to NOKUT, and how the case handling systems support the work of case handlers. Service design methods are used for analyzing the case handling practice. The case handling is explored through an ethnographic approach [16]. The research questions for this study are:

RQ 1: What are the communalities and differences between the various case handling processes?

RQ 2: How do the digitalized case handling systems support the case handlers' processing of different cases?

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The rest of this paper is structured as follows. Section II describes the methodology and methods used. Section III describes NOKUT and the different case handling processes. Section IV discusses the results of the study. Section V suggests some implications for design for supporting the most complex case handling practice. The last section offers some concluding remarks.

II. METHODOLOGY AND METHODS

The study was conducted as an ethnographically inspired case study where the main methods for data collection have been participant observation, interviews and document studies. The fieldwork took place as weekly visits to NOKUT offices, with averagely one day a week over four months during the fall of 2019.

We had free access to NOKUT employees and spent our time in their open office landscapes. We attended internal meetings, and shadowed and interviewed case handlers while they were performing their work. As such, we became part of the work environment, talking and socializing with NOKUT employees.

The interviews with case handlers and section heads were carried out as informal, unstructured interviews of various length, often taking place spontaneously during the fieldwork. These conversations were focused on understanding case handling practice. The interviews were not recorded as such conversations were often impromptu. Instead, notes were taken with pen and paper. Finding and starting a recording device whenever a "promising" conversation started would have been disrupting for the contact established in the situation. This means that we have few verbatim quotes from the case handlers, although some particularly interesting quotes were memorized and written down as soon as possible.

Document studies were carried out to understand NOKUT's goals and responsibilities as well as their working plans.

Methods from service design have been used for both describing the case handlers' work and for analyzing the steps that the case handling consists of. The service design method journey mapping was used to analyze case handling practice. Co-creating journey maps offers methods for analyzing the case handling for the different application types together with the case handlers. A visualization of the casework as a journey map is co-created to illustrate the differences and commonalities between the case handling for the different application types.

The design methods "touchstone tours", "contextual inquiry" and "journey mapping" were used to explore, describe and analyze different aspects of the work of the case handlers with the different application types. As these methods are rarely used as part of a case study, they are described in detail below.

A. Touchstone Tour

In order to understand the physical space in which the case handlers of the Department of Foreign Education perform their work, two walking touchstone tours [17] of NOKUTs offices were carried out. The first tour was with a section head, the second with a case handler. The aim of the tours was to gain insight into what a workday looks like for a NOKUT employee, focusing on what objects they interact with and the rooms they use for different activities. Both tours took 15-20 minutes from start to finish. Photos were taken during the tours, and we took notes using pens and paper.

B. Contextual Inquiry

Contextual inquiries involve the researcher taking on the role of novice, while the expert (in this case the case handlers) performs a task [18]. The novice asks questions in order to understand and clarify what is happening, and the two people together form a common understanding of the issues at hand. We focused on which IT systems were used, how they were used, what steps make up the actual application processing, which people were involved in specific decisions and what tools were used in order to give applicants a final answer. This method was employed over our four months at NOKUT, with seven different case handlers across the two sections, in sessions of varying lengths (30 min - 3 hours). Notes were taken with a pen and paper throughout the sessions.

C. Co-creating Journey Maps

Journey mapping is a service design method that presents events or touchpoints in chronological order to visualize a process [15]. In order to map the case handling practices, two case handlers from the different sections took part in co-creating a journey map [13], based on the insights gathered. The journey map was drawn concentrating on the core steps of the practice. Post-it notes and markers were used on a whiteboard to simultaneously analyze the case handling practice for all three types of applications. The case handlers were asked questions during the mapping process in order to clarify statements and placements of post-it notes. The case handlers used the provided materials to analyze the journey an application takes from when it enters NOKUT's digital application systems to when the applicant receives a reply.

D. Ethics

We signed a standard non-disclosure agreement with NOKUT, which they also use for external consultants. We did not collect personal data about the case handlers or managers as our focus was on collecting data about the case handling process and their use of system support in their work.

In the fieldwork, we could observe applications to NOKUT, but did not collect any data about the applicants nor the applications. Pen and paper were used for interviews and observations. According to Norwegian rules for research ethics, this kind of data collection does not necessitate evaluation by an ethical board, as it does not involve personal data.

Our introduction to the NOKUT employees took place in meetings, where we presented the project and discussed voluntary participation. The study was endorsed from the manager of one of the sections, and all participants in the study are NOKUT employees. We were given a work desk

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in one of the sections, where we were free to contact the case handlers and other employees. As most interviews happened spontaneously, we did not use consent forms for each individual person interviewed. Consent for an interview was granted orally. We have no indication of any case handlers or section heads wanting to withdraw from the study.

III. CASE HANDLING AT NOKUT

NOKUT consists of five Departments: the Departments for Quality Assurances and Legal Affairs, Evaluation and Analysis, and Foreign Education work with accreditation and recognition of Norwegian and foreign education respectively. There are two administrative departments for Administration and Communication. NOKUT's Department of Foreign Education is comprised of four Sections: the two sections described here are the Section for Recognition of Higher Education and the Section for Recognition of VET and TVET, where VET stands for "Foreign Tertiary Vocational Education" and TVET for "Foreign Vocational Education and Training". Additionally, the Department houses a Section for Interview-based Procedures and a Section for Information about Foreign Education.

Three types of applications are managed at the Department for Foreign Education:

- Recognition of Foreign Higher Education involves recognition of education from universities and university colleges.
- Recognition of VET involves recognition of vocational education completed after upper secondary education; usually training that takes between 6 months and two years.
- Recognition of TVET recognizes vocational training and education on levels comparable to Norwegian upper secondary education, and craft or journeyman's certificates. This recognition is only available for applicants from five Eastern European countries and is limited to 17 professions.

Applications for Recognition of Foreign Higher Education are processed at the correspondingly named section, while the Section for Recognition of VET and TVET processes both application types concerning vocational education.

Two IT systems, ESAM and Public 360°, are used for supporting the case handlers' work. ESAM is a custom-built case handling system developed by NOKUT's section for information and communication technology (ICT) in cooperation with hired consultants. The system was first customized for applications for recognition of higher education and has since been expanded to include VET applications. NOKUT's goal is that ESAM will be used for handling all applications, with a possible long-term goal of automating much of case handling. TVET applications are still processed using 360°; an off the shelf general case handling and archival system originally used for all case handling at NOKUT. 360° is still used as an archival system for all applications, but for TVET applications, it is the only digital case handling system.

A. Case handling takes place in several sections

The actual case handling of the applications varies a lot, from relatively simple and standardized, to very complicated and involving many steps. However, there are some key similarities between how applications are managed across the two sections of the Foreign Education Department.

Case handlers mostly work alone on applications. They might ask co-workers for advice or discuss particularly tricky cases with others, but in general, each application has one case handler who works on the case alone. Managers and co-workers are involved with quality assurance of the process and the resulting decision letter to the applicant.

Not all case handlers work with all kinds of cases: both in higher education and in VET and TVET, there are area experts who have knowledge about education within a particular geographical area. Some areas are "easy" and can be managed by everyone, while some areas are only managed by area experts. Some case handlers in the Section for Recognition of VET and TVET only work with VET, some work only with TVET, some do both. No case handler works in both sections, so case handling for higher education and VET and TVET are completely separate.

All applications are managed through one of the two IT systems, ESAM or 360°. Since 2016, case handling is digitized, and applicants are encouraged to apply through an online application portal.

Apart from these key similarities, there is a lot of variation in the actual case handling practice. The main difference lies in how different types of applications have differing levels of complexity. Recognition of higher education relies heavily on international networks and databases comparing (usually) well-documented education. On the other hand, recognition of VET and TVET requires complicated evaluation of professional skills that are not related to international standards, such as ECTS-credits. Here, expert committees, old curriculum and translation of local documents are required parts of the case handling practice, increasing the level of complexity. This also results in widely different processing times: cases of recognition of higher education have an average processing time of 7.5 hours, while a VET or TVET application can take anywhere from 21 to 329 days.

In addition to the two sections that carry out case handling of applications, there are other departments and sections at NOKUT that are important to case handling, such as the Section of Interview-based Procedures, which the case handlers also refer to as "the Refugees Section". They work with applicants who cannot document their education, or whose documents come from areas the Norwegian government "does not trust". This mostly includes conflict areas like Yemen and Syria. Applicants who apply for recognition of higher education can be forwarded to this section, but not applicants within the VET and TVET systems.

Another important collaborator is the Switch Board / Reception / Information Centre, where a collection of NOKUT employees handles direct contact with applicants and the general public. NOKUT case handlers are not

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directly available to applicants through phone calls or personal e-mail, unless the case handler explicitly encourages this. Most communication with applicants goes through the online application portal, but some applicants still call NOKUT with various queries. The communication between case handlers and the employees who answer phone calls is therefore an important line of communication.

B. Different steps for the different applications

Some elements of the case handling are at the core of all application processing, while other aspects belong to edge cases. In the journey map workshop, the case handlers agreed on, and numbered, stages 1 through 4 as the common core stages for all application management:

1. The application arrives in either ESAM or 360° and is selected by or given to a specific case handler. The application is looked through and the case handler makes sure all required documents are included.
2. The actual evaluation of the education takes place. This includes different steps and levels of complexity depending on the circumstances and type of application.
3. Quality assurance of the proposed outcome of the evaluation is performed, either by a co-worker, a manager or both.
4. A decision letter is sent to the applicant. This could be a rejection of the application or an approval of the foreign education. Additionally, it could include a recommendation to apply for another type of recognition or the forwarding of the case to the Section for Interview-based Procedures.

Figure 1 shows the result of the journey map that was co-created together with the case handlers of the two sections, using post-its and markers on a whiteboard.

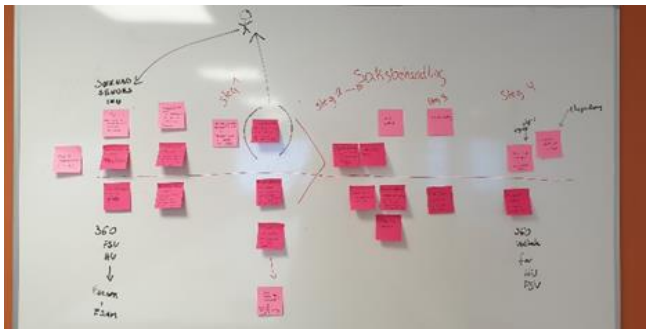

Figure 1. The first version of the journey map illustrating the steps of the case handling.

This figure was re-worked for the final journey map shown in Figure 2. This re-worked journey map illustrates the differences and similarities between the case handling processes. There are three application handling processes for the three application types higher education, VET and TVET. The first step shows that the application is received and selected by a case handler. The document check is shown as a separate step, as it often resulted in communication back and forth with an applicant, or even the rejection of an application if the required documentation was not produced.

The third section, evaluation and recognition, is the main part of the case handling, consisting of only one step for Higher Education applications, and up to four steps for TVET. The only step in this section that the three application types have in common is what the case handlers call “system evaluation”. This involves evaluation of the level, the scope and the duration of the education. For higher education applications, this is the only step. For VET and TVET, this is only the beginning. VET additionally recognizes the professional profile of applicants, while TVET applications must be checked against NOKUTs existing precedence database. If no similar cases have been processed previously, case handlers must obtain the foreign curriculum for the education. The curriculum then needs to be translated and processed before being evaluated by expert professionals, who decide whether the education can be equated to its Norwegian counterpart.

The last step involves deciding on the case and includes quality assurance. The quality assurance step is usually more of a formality, as the outcome is rarely changed based on this feedback. Finally, a decision letter is dispatched to the applicant.

C. Differences in complexity

Case handling of applications for recognition of foreign higher education is, in most cases, straightforward. If applicants provide documentation of higher education, international standards for higher education, such as the European Credit Transfer and Accumulation System (ECTS) from the Bologna process [19], makes recognizing equivalent education relatively easy. It requires mostly a recognition of credits, level of higher education (Bachelor’s, Master’s or PhD) and the amount of time spent on the studies. Online portals list accredited foreign education for most countries. Additionally, as most countries provide a service similar to NOKUT, recognition of foreign education can be standardized between neighboring countries, or regions with similar education systems. This highly regulated practice leaves less room for interpretation for case handlers and reduces complexity and processing time, which averages to only 7.5 hours for a case.

Processing applications to VET and TVET shows greater variety and involves more steps. In order to recognize foreign vocational education and training, case handlers need to have the specific curriculum from the teaching institution, time period and qualification that the applicant has documented in their application. While applicants need to provide documentation of their education, they are not responsible for providing the documentation of their curriculum. Finding the curriculum can be challenging: case handlers describe visiting libraries and public archives in other countries and exploring old basements in public buildings looking for documents. There they would scan or take pictures of as much relevant documentation as possible. Finding curriculum also involves cooperation with people working in foreign libraries or archives, who can obtain

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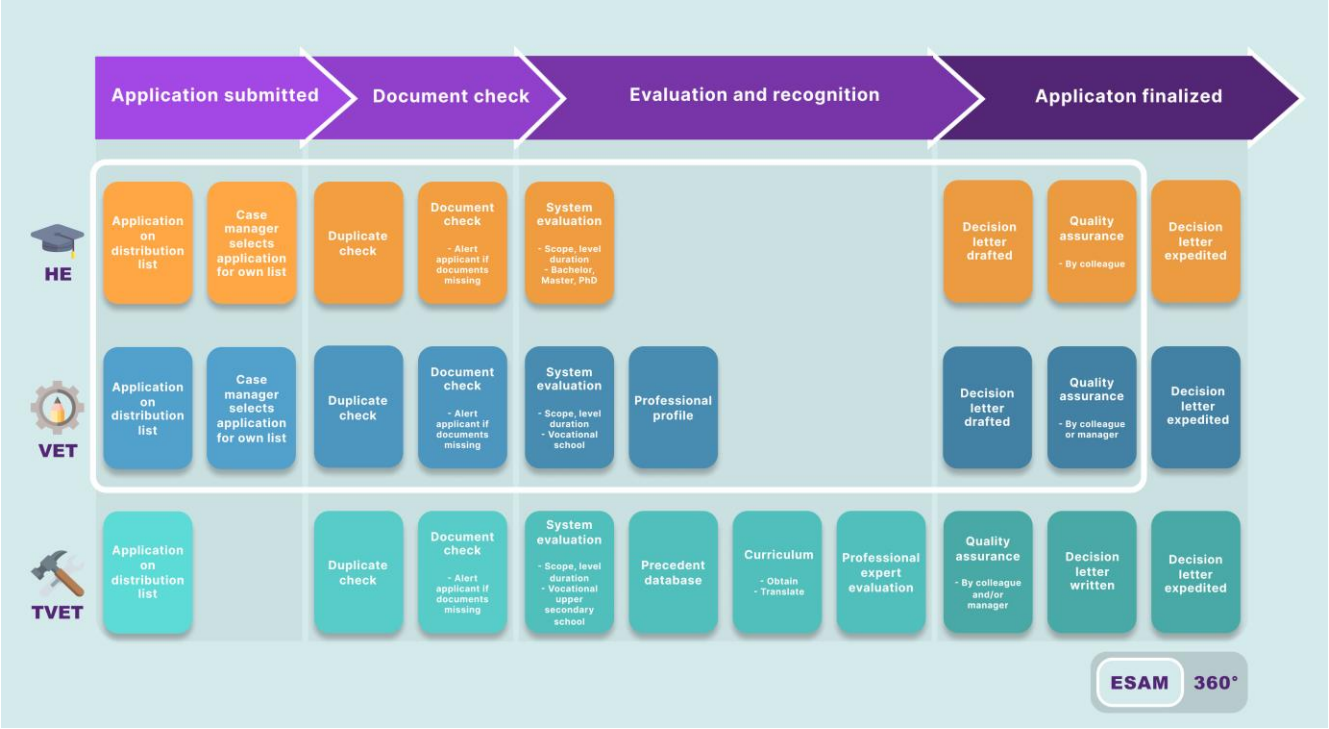

Figure 2. The final journey map illustrates the differences and similarities between the three case handling processes.

"helpful" curricula without anyone from NOKUT needing to travel. In these cases, case handlers have a network of contacts who can be contacted via email or telephone. In some ex-Soviet states local- or state archives have been burned, making it impossible to find documentation of old curricula. In these cases, the education cannot be recognized. These steps add considerable variety and complexity to case handling and processing time.

If a case handler manages to locate the curriculum, the documents need to be translated into Norwegian before experts can evaluate whether the qualification would equal a similar qualification in Norway. Some foreign curricula can be several hundred pages, while an equivalent Norwegian curriculum can be 3-5 pages. Recognition of TVET is not carried out by many other countries, meaning international standards, databases and networks are limited. Translation work followed by external professional expert evaluations without internal support further prolongs processing time and increase complexity, resulting in some TVET cases taking almost a year to process.

While this case handling practice is complex, it is currently performed using a case handling system that offers zero system support. While ESAM provides extensive system support and is developed to closely "guide" case handlers through pre-defined steps in the application process for higher education and VET applications, 360° offers no such support. Case handlers for TVET use their well-established practice and "know how" to process the applications as required, given the specific circumstances of each case.

D. Levels of complexity in practice

Several case handlers at the Section for Recognition of VET and TVET made comments along the line of "it's not always like this" or "usually we would do it like that, but because of X we have to do it like this", demonstrating how practice is not just "rule-following" [6]. The level of detailed understanding needed to know how to process an application showed great skill from the case handlers on when to follow the rules and when to adapt to circumstances, in line with Schmidt [6]. While the basic steps of case handling can be defined and followed, a lot of the practice builds on "know-how" developed over time and through experience. The case handlers are aware of these differences in complexity. One newly hired case handler in the Section for Recognition of VET and TVET described how she had been instructed to focus on VET applications, to "get to grips with the basics". When working with VET cases she would have the benefit of them being less complex, in addition to system support from the custom build ESAM system.

The case handlers at NOKUT had such a "feel" for what decisions to make, which is not explicitly described in the "standard practice". While some degree of complexity was present in all case handling practice, recognition of higher education was closer to "rule-following" than the VET and TVET applications. The journey map (Figure 2) visualizes case handling steps from the "simple" higher education recognition, through the more complex VET recognition and ending in the most complex TVET recognition. The extra case handling steps that are identified for VET and TVET

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consist of the most varied case handling for this kind of education and visualize an increasing level of complexity.

IV. DISCUSSION

Insight gained from ethnographic studies can be complex and come in many forms [16]. Deep situational understanding and learning is why the methodology lends itself to researching complex socio-technical environments and practices, but also makes findings difficult to synthesize or summarize. Deep insight into the use situation and the user's actual work practices is a prerequisite for technology design within CSCW. Findings should be shared with fellow researchers, participants and other collaborators in order to better design technologies that support cooperative work [8]. In order to design such systems, both designers and workers need to understand and be able to communicate about practices relevant to the systems. By analyzing the case handling at NOKUT as a service, the practice of processing applications can be visualized as a series of activities with a fixed start- and endpoint. The benefit of visualization is to communicate different information about the steps and the complexity of the corresponding case handling process.

Journey mapping is not the only way to visualize complexity. Methods such as giga-mapping [20] could lend itself to visualizing the complexity by mapping all relevant stakeholders or systems in a practice, but would not ease a reader's understanding of the different steps that make up the process. Service blueprints have been used for visualizing processes, including both organizational and customer perspectives [15], but would in our case show both NOKUT's internal processes as well as frontstage events towards the applicants. The overall result can be cluttered and focus too much on existing systems to support the needs of case handlers. In contrast, by co-creating a journey map with the case handlers, their practice is the focus of the visualization. The co-creation helps both case handlers and researchers to understand and agree on what the practice looks like and can contribute to a shared language and understanding between them. Additionally, the relative simplicity of the visual expression of the journey map and the singular focus on case handling practice reveals complexities in the practice that are vital to designing appropriate systems.

Schmidt [6] writes that "understanding work practices as a basis for systems design has become a practical necessity". We argue that using service design methods in conjunction with an ethnographical approach can boost researchers' understanding of a work practice, by providing a framework for visualizing it. In utilizing journey mapping, complexities in practice can be highlighted, providing further insights that are valuable for designing systems appropriate to supporting the practice.

V. IMPLICATIONS FOR THE DESIGN OF CASE HANDLING SUPPORT

The objective of CSCW research is to gain insight into actual work practices for designing better digital support [8]. NOKUT's case handling process for higher education is relatively simple and is represented by fewer steps for evaluation and recognition than VET and TVET in Figure 2. The application handling processes can be ordered according to a level of complexity from low (higher education), to middle (VET) and high (TVET), mirrored in the number of steps in Figure 2 for each type of application. While the case handling processes for VET and TVET contain more steps than for higher education, the process still starts and ends with the same basic steps. When developing the new system for case handling, ESAM, the in-house developers started with higher education. The first version of the system could handle the "straight forward" applications and supported the steps that all applications go through. Later, the system was expanded to also include handling of VET applications. The case handling process of the TVET applications is however supported by using a general document archival system, 360°, with no specialized process support.

Thus, the most complex cases currently have the least amount of system support. Because these case handling processes have such varied steps and rules, and require very varied skills, such as nurturing international networks of helpful contacts to find a curriculum document in a basement archive in a foreign state, it would be almost impossible to design detailed system support for all possible steps in a case handling process. Such a system would risk being cumbersome and time-consuming in use as it would need to represent several possible steps and actions for a case handler to take, where many would be irrelevant in most cases. It could additionally hamper case handling as it may require navigating irrelevant choices and ticking off irrelevant boxes. In line with Røhnebæk [4], it would require negotiation and various workarounds [21] to use and we argue it would offer case handlers little real support for their work.

We suggest instead that an expansion of ESAM to include management of TVET applications should mirror the current case handling practice, by providing a minimal structure of support to give case handlers "room" to process applications as best, based on the circumstances and complexity of the actual case. By keeping the support minimal, case handlers won't be hampered by unnecessary steps when using the system. They have already proved their capability to manage applications with only generic archival system support, and we believe trying to create a system that closely supports all the possible circumstances of a TVET application would be too cumbersome and thereby unbeneficial. Case handlers of the most complex cases would benefit from a system where the steps that make up the work process are represented with more room for variety and minimal structured system support.

However, if in the future, more countries change their practices and start recognizing VET or TVET educations, international resources and standards for such educations may develop. These new circumstances could affect NOKUT's case handling practices by reducing the level of complexity for these cases. This again could affect the suitable level of system support.

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VI. CONCLUSION

Through field studies within an ethnography-inspired case study, supplemented with methods from service design, we explored, analyzed and visualized the case handling practices at NOKUT for recognizing foreign education. These visualizations show that the case handling processes for different types of educations contain almost similar steps in the beginning and end of the case handling process but vary for the central steps of evaluation and recognition, based on the circumstances and types of education recognized.

We argue that service design can be complimentary to ethnographic studies in analyzing and visualizing complex practices, given that the practice lends itself to being explored as a service. By exposing variations and complexities, service design methods contribute to understanding actual work practices, which provide a sound foundation for systems design in CSCW.

NOKUT receives applications for recognition through an online portal but uses different IT systems to manage the different types of applications. This use of different case handling systems does not fundamentally affect the steps of the case handling process. Applications processed within the same section (VET and TVET) do not have the same case handling practice, because the academic and professional assessments are not the same. Applications with complex academic and professional assessments have a longer average processing time. Applications with a less standardized case handling practice have more steps in the assessment process and have a longer average processing time. The level of complexity in the type of application processed, rather than the type of IT systems, is what affects the complexity of the case handling.

When developing new system support for the most complicated cases, we suggest a design that provides a minimal structure of support to give case handlers "room" to process applications as best based on the case handlers' experience and the rich variety and circumstances of the cases.

We purpose this approach to systems design can be useful in other development of case handling systems, where designing system support for all circumstances and complexities in case handling practice would be both cumbersome, expensive, time-consuming and unnecessary.

Future research on digitalization of work processes could include whether visualizing complexity of the case handling process could be important for assessing which case handling practices are eligible for automation.

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