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Conditions for Autonomy in the Information Society

Disentangling as a public service

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Abstract. An ambition for a democratic information society is providing services that maintain and even enhance citizens' mastery and control of their life situation. Analyzing public services from a citizen autonomy perspective can indicate where the service and its IT-systems do not support user autonomy. We analyze a public service and discuss it as a sociomaterial entanglement. Based on our data on citizens' use of a public service we identify a need to distinguish between entanglements and imbrications and suggest the notion of disentangling in order to characterize the way in which the public service advisors help the citizens. From at a design perspective we look for openings for change and improvement. Different types of entanglements need different types of competencies to address them. We make a distinction between entanglement and imbrication to open up a space for change. Finally, we discuss how the notion of disentangling tax issues can support citizen autonomy.

Keywords: Sociomateriality, entanglements, imbrications, autonomy, tax.

1 Introduction

The Norwegian white paper "An Information Society for All" (Fornyings- og Administrasjonsdepartementet 2007) envisions an interactive society in which all citizens are offered and are able to make use of digital services. In the interactive society information systems are a part of everyday life of all citizens—as infrastructure or as part of citizens' activities or both. The society

Debate section

is profoundly dependent on its technologies, and the technologies are intertwined with how the society is organized. This poses challenges for how government presents itself and acts towards the citizens as well as challenges for the citizens as actors and users of technology-based services. Public agencies increasingly present web-based façades towards the citizens—our concern in this paper is to investigate and discuss if and how public services support users' autonomy, in particular public services that depend on IT systems. An important ambition for a democratic information society is to provide services that maintain and even enhance users' autonomy as citizens. This is the basic assumption in the research project "Autonomy and Automation in an Information Society for All" (van der Velden et al. 2009) in which this paper is grounded.

The paper reports from an empirical study of how citizen autonomy is challenged and supported by various parts of a public agency. The contribution of the paper is twofold. One is the analytical framework developed to analyze what makes a situation complicated for the citizen. The other is an extension of sociomaterial theory where we suggest that the notion of imbrication is taken to denote a particular kind of sociomaterial entanglements, and we introduce the notion of disentangling as a concept for describing how a sociomaterial entanglement must be addressed to create a space for action and change. The paper argues both empirically and theoretically for the necessity for a public agency for disentangling a complicated situation in order to enhance citizen autonomy.

The paper is structured as follows: In this introductory section we present the conceptual background for the paper. In section 2 we present the research approach and methods. Section 3 reports from the empirical material in three examples of taxpayers calling the Tax Agency call center and advisors helping them on the phone, also presenting our analysis of how and what makes the situation complicated for the caller and the advisor. The fourth section discusses the theoretical concepts in more detail and we introduce the notion of *disentangling*, as a way to explain how the citizen is helped. In section 5 we come back to the concept of autonomy and try to open it up: What does autonomy mean for users of public services, and how can autonomy be supported and enhanced? The last section concludes the paper.

1.1   A sociomaterial perspective

Our study of citizens' autonomy in public services is based on a sociomaterial perspective seeing the public service as a sociomaterial assemblage in which the agency of both technology and people are constituted. The intimate tangle of technologies and organization is the focus of scholars studying sociomateriality. Technologies, people and organizations are seen as mutually constituted in an imbrication (Sassen 2002; Leonardi 2011), entanglement (Orlikowski 2007, 2010; Orlikowski and Scott 2008) or a sociomaterial assemblage (Suchman 2008), where they can be separated only analytically. The sociomaterial perspective enriches our understanding of the relations between technology, people and organization in that it focuses on the entangled nature of sociomaterial assemblages.

The recursive intertwining of humans and technologies in practice makes it impossible to talk about technology as an external driving force or that human agency is all that matters when we want to explain modern societies and change (Orlikowski and Scott 2008). A challenge for researchers has been to understand and describe the dual view of technology and society devel-

opment without putting too much explanatory power on one or the other side of the dualism. In this perspective autonomy is seen as an outcome of the assemblage rather than a property of humans or artifacts. Autonomy is an effect of ongoing and (more or less) durable sociomaterial practices (Suchman 2007).

The concept of entanglement was introduced to Information Systems research by Orlikowski (2008) in a discussion about the notion of sociomateriality helped analyze how technology use involves a close interplay between social and technical issues: The "entanglement of the social and the material – 'a mangling of human and material agencies' (Pickering 1995) or what Suchman (2007) calls 'a creative sociomaterial assemblage'." (Orlikowski 2007, p. 1440). "Entangle" means to wrap or twist together or to cause (something) to get caught in or twisted with something else, or to involve in complicated circumstances (Oxford Concise Dictionary 1999). Orlikowski (2007) builds on Barad (2003), who discusses quantum entanglement based on Niels Bohr's work, where she emphasizes that a human observer cannot be separated from the phenomenon s/he observes, but will be entangled with the object of observation. Barad's argument is similar to Pickering's (1995): the phenomenon we observe is entangled with the apparatus for observation and ourselves as observers. Barad claims that Pickering sees entanglements as epistemological, not as something ontological (2003, footnote 9). The entanglement is related to our perceptions and understandings. To be able to talk about observer and observed, about "agencies of observation" and "object", a constructed cut must be made between these, called "the agential cut" (Barad 1999). The agential cut is neither arbitrary nor given, and defines how we "choose" to separate the agencies of the observer and the observed.

"The mangle operate[s] … at a level of detail not usually accessible to empirical study", says Pickering (1995, p. xi). Orlikowski describes how technical detail is involved in sociomaterial entanglements, drawing on the Google Page Rank algorithm and the Blackberry email push functions as examples (2007). The email push function on the Blackberry phones in the "Plymouth" organization that she studied gets intertwined with the ways in which work is organized and carried out: How the email routines change, which in turn influences the practices of using the email push function: It is the company policy to have it turned on.

1.2 Citizen Autonomy in the Information Society

Our concern in this paper is if and how public services support citizens' autonomy: Do they support citizens acting freely according to their own choices? To act in their own best interest might presuppose knowledge in many areas. We are therefore concerned that the citizens know and understand enough, and can reason about their choices. Acting requires understanding. What if the citizens cannot figure out what to do?

Autonomy

The Concise Oxford Dictionary (1999) defines autonomy as "the possession or right of self-government" or "freedom of action". The word comes from Greek *autonomous*, "having its own law". Acting freely means that people should be able to act according to their own norms and

plans – their own "law". Without going into a discussion about rational choice (Simon 1991; Kahneman 2003) we take the view that in order to govern themselves people need to a certain degree understand to their choices and what they imply. Based on this view we see autonomy as something scalable, where people can have more or less autonomy in different situations.

The concept of autonomy can be defined and interpreted differently (van der Velden et al 2009). We find, however, that this brief discussion on autonomy is sufficient as an introduction to our analysis. In Section 5 we discuss the concept more thoroughly on the basis of our analysis.

eGovernment

The eGovernment research field studies how the public or citizens and the government workers experience the increasingly automated government. Introducing IT to government work involves both the making of a socio-technical infrastructure for eGovernment and changed work conditions for government workers. Studies of changes in work for government workers and local politicians introduced by IT point to extra work and new work tasks (Bowers 1994, Mörtberg and Elovaara 2010).

There are very few studies addressing the whole situation for the e-government citizen. Some studies point to difficulties of citizen participation in development of eGovernment projects (Ekelin 2007; Borchorst and Bødker 2011), and some to successful participatory design (Axelsson et al. 2010).

Some studies express concern that eGovernment services risk increasing the digital divide. eGovernment users are found to be younger, whiter, wealthier, more urban and better educated than the average population (Jaeger 2005). One study point to the ironic situation that families will need to apply online for welfare services, where the citizens in need of such services are among the less likely to have a computer and the competence to use it for online welfare applications (Bertot and Jaeger 2008).

In this paper we focus on the use of eGovernment services by citizens as a way to understand how a service creates and solves problems in their life situation. The starting point of our study is the increasingly smooth façade that the government presents to its citizens as more tasks and citizens' duties are automated by IT, and work is delegated to the citizens by means of online self-services. ICT makes it possible to make increasingly complicated arrangements and systems for online self-service by the citizens. We investigate the sort of problems citizens experience while managing their tax or fulfilling their civic duties, and how the public agency relate to these problems.

Citizen autonomy in the information society

Analyzing public services from a citizen autonomy perspective can help us identify where the smooth façade do not support citizens' mastery of their own situation or even hampers their autonomy. Workers' mastery of technologies used in their work has been a long-standing focus within participatory design (Bjerknes et al. 1987). As an example of a public service we focus on tax – also because the Tax Agency is in the forefront when it comes to IT support for their services. Tax and its digital presentations can be experienced as entanglements where rules and

regulations, electronic services, web forms, paper forms, IT systems etc. cannot easily be separated.

2   Research method

We base our analysis and discussion on fieldwork from the Tax Information Call Centre (TICC) where citizens can call if they need help with their tax issues, carried out by Verne (2011). Before we describe our research approach we give a brief introduction to the case context.

2.1   The Norwegian Tax Information Call Centre (TICC)

The Norwegian Tax Agency has succeeded in establishing a sociomaterial infrastructure that enables the automation of most of the tax calculations, based on data sent to the Tax Agency from employers, banks, insurance companies, social security offices and other public agencies. The employer calculates, deducts and pays the predicted tax for the employee. All employees will need to have a tax deduction card, which shows how much tax the employer should deduct from the salary and pay to the Tax Collector. This tax payment is only an estimate of the correct tax.

On the basis of the tax return at the end of the year, the tax authorities calculate the exact amount of tax to be paid for the previous year. Every citizen receives a tax settlement notice, which provides information about the income, fortune and debt on which the tax is calculated, and information on whether too much or too little tax is paid (by the employer). If too much tax is paid the taxpayer receives the excess amount, if too little tax is paid the taxpayer has to pay the remaining amount. The taxpayer can appeal the tax assessment, but has to pay the outstanding tax while the complaint is being processed by the Tax Agency.

The Tax Information Call Centre (TICC) is a separate unit within the Tax Agency. In 2010 the TICC received 2.2 million phone calls with an average duration of 3.23 minutes. The Tax Agency sees TICC as an expensive channel for communicating with the public, and wants more citizens to use the web instead.

The Tax Agency has a web site with information about tax rules and regulations. Some services, like ordering or changing a tax card, are electronically available. Still, people often call and ask questions where the answer is relatively easy to find on the web site. Even if a tax card can be ordered digitally on the web site, many young people, who are experienced users of digital services pick up the telephone in order to ask the agency to send them one. Some callers say that they do not have Internet available (their PC has crashed, they are not familiar with using digital services etc.) and many callers tell the advisor that they have tried and not succeeded in using the digital service.

The agency's official policy is that the advisors should direct the callers to the web site for self-service if this is available for the case at hand. The callers are expected to learn how to use the digital self-service and use it instead of calling a next time. This is seen as a more long-term help in that the taxpayers next year can help themselves without calling TICC. This policy often

creates a dilemma for the advisor. In practice the advisors will often help the callers in various ways while on the phone.

By letting the callers handle things themselves (e.g. filling in and returning a paper form) the advisor knows that there is a risk that this will not get done, and that they will do nothing or call once more or at a later time. If the caller has small economic means, this can indeed create a dire life situation with too little net income or even a tax debt.

There are many reasons why advisors carry out services that are available on the web site, as one advisor commented: "We cannot expect that the callers make up an average of the population", indicating that the average taxpayers are able to read and make use of the information on the web.

The advisors register the questions, however, the registration system does not include categories for what causes most trouble for the taxpayers. If a caller tells the advisor that s/he has not succeeded using the online service for ordering a tax card there is no category for the advisor to register this. The Tax Agency expresses an "introvert" attitude towards registering the questions from the callers (Verne 2012). Reports and statistics made on the basis of these registrations therefore do not convey any information about how the services are experienced by the taxpayers. Such information could have been used to improve the online services in supporting the taxpayers.

Figure 1. A tax information call advisor at his desk answering the phone.

2.2 Research design

We report from fieldwork comprising 15 sessions of "co-listening" on the TICC telephone service in addition to interviews and observations of TICC advisors, as well as document studies, over a period of 22 month.

- *Co-listening* involves the researcher sitting together with a tax advisor at his/her desk, with a headset for listening to phone calls and with a position that allows the researcher to see what the advisor is doing on the computer screen and on the desk. The researcher takes (handwritten) notes of what the callers ask about as well as what the TICC advi-

sors answers, what they do to solve problems, and how the IT systems support (or not) the actions of both the TICC advisors and the callers.

Co-listening is routinely taking place at the call centers, as a way of training new advisors and improving the answers for all advisors. It is also used for letting case handlers from other units of the Tax Agency learn about the kinds of questions people are asking TICC about. All people co-listening – including the researcher – have signed non-disclosure agreements to protect the privacy of the callers.

- *Interviews*. Eight semi-structured interviews of approximately one hour and a half with tax advisors and their managers have been taped and transcribed.

- *Observation* has taken place as a supporting activity to the co-listening. While being in physical locations of the call center doing co-listening and interviews, the researcher also has observed work practices. In the offices there are several screens and whiteboards that report the daily traffic on the phone, recurrent topics of the calls and about the advisor's work schedules. Field notes have been written immediately after the visit.

- *Document studies.* Various steering documents and annual reports have been read to get an understanding of the strategies, objectives and plans of the TICC.

The data analysis started as soon as the data gathering began. Preliminary data analysis has influenced the data gathering inductively. Interviews and notes from the phone conversations have been analyzed and marked, and we have done several rounds of interpreting the data (in line with Glaser and Strauss (1967)) identifying patterns and categories. The analysis has been built up inductively from the data.

3   Analyzing citizen behavior practices

In this section we report from a few examples of people calling in to the TICC. In order to understand the examples and how they got handled we needed to take a step back and consider the taxpayers and the TICC as a part of a larger sociomaterial assemblage. What struck us during the analysis of the data was that most questions did not concern difficult tax problems; most questions were rather simple but they still came out as a very complex mix of formal, technical, social and organizational issues. This entanglement of very different issues was problematic for the taxpayers calling in. The empirical material indicates that what is making a question complicated for the caller is not the complexity of the rules alone but the caller's life situation or the context of the call situation. The caller cannot find documentation of claims, cannot carry out percentage calculations, does not know what interest cost is, needs her mother to call, cannot use the Internet, does not have the correct address registered, is sick etc. The instructions to the advisors address such problems only superficially.

A table can illustrate the relationship between complicated tax rules and complicated life situations or context and what kind of help the citizens need.

Tax rules Contexts	*Easy*	*Complicated*
Easy	Well suited for online self-help, TICC can guide the caller to, or through, the web and this opens up for action by the caller	TICC looks up the rules, and may refer to second line support, it is the Tax Agency who needs to clarify
Complicated	Caller needs help from the TICC advisor, who sorts out steps to do for the caller or carries out some of the steps	Rarely occurs, characterized by inseparable interdependencies between social and technical/ legal/ formal issues

Table 1. Relations between easy and complicated tax questions and contexts/ life situations.

The instructions of directing callers to the online pages do not address callers with a complex context (the lower row). If the callers' context is not taken into account Table 1 collapses to the upper row, where the only dimension is easy or complicated tax issue. This hides the fact that it is the individual life situation, outside of the Tax Agency, rather than the complexity of the tax issue that creates difficulties for people. The complexity of the tax issue does not alone determine whether people can help themselves or need help from an advisor.

Below we present examples of taxwise easy calls from callers in complicated contexts, i.e., the lower left corner category of Table 1. We present three calls that were among the longer calls as they took between 10 and 20 minutes, indicating that they are more complicated than most calls. The fourth subsection discusses the kinds of calls categorized in the other three fields of Table 1 above.

3.1 Single father needs a new tax card

A man calls the TICC in late October. He speaks in a low voice, and the connection is bad so the advisor has to ask him to repeatedly explain his situation. It is difficult to get the grip of what he is saying, but slowly a picture emerges that he is a single father of two small children. By looking up the data in the Advance Tax Database the advisor does not need to understand everything that the caller is saying, as the data can tell about erroneous taxation better than the caller can do. The caller is also unemployed, receives unemployment benefits and works part time in a kindergarten. He wants to change his tax card, and be taxed in tax class 2 (like all single parents are entitled to). The call advisor asks for his national identity number and uses this to look up background data for his tax card in the Advance Tax Register. He can see that tax is calculated off the caller's benefits when it should not. This tells the advisor that too much tax has been withheld. The advisor makes some calculations on a small handheld calculator while he is asking some follow up questions. The caller mentions that he became a single father some months ago. The advisor says that "you should preferably tell us such things electronically" but he does not follow the routine asking him to use the online services. Instead he asks the caller to verbally confirm that he is receiving a benefit. When the caller responds adequately to this

the advisor change his tax class to 2, enters some new figures in the Advance Tax Database entry for the caller and issues an exemption card: A tax card for low incomes where no tax payment is required. This will free the caller from paying tax for the rest of the year, which will quickly improve his economy.

When we asked the advisor why he did so and helped the caller by manually updating the database he replied "there are some people that are stuck and I thought he was there": The advisor deviated from the routines to be able to help him immediately. The advisor closes the call by stating that he himself "has been nice" and helped the caller, and urges the caller to update the information after the turn of the year so that he receives a correct tax card for next year. Because it was late in the year the updates done by the advisor will not be transferred automatically to the next year.

The caller in this case was dependent on the tax advisor both to tell him how the rules applied to his situation and *fix* the figures and tax class. The tax advisor helped him do the first moves towards a better life situation. In a tax perspective this call was not very complicated. The rules are clear and unambiguous, and for the advisor it was easy to see how the rules should be applied in this situation. The advisor helped the caller "untie" the sociomaterial entanglement of the "tax knot" by changing three numbers in the database.

3.2   Mother calls for daughter to complain about tax payment

A woman is calling the TICC. She says she calls on behalf of her daughter, who has underpaid tax last year and has to pay the rest this year. The mother gives her daughter's national identification number and the advisor enters the number in the log system. Her address from the Population Register pops up. We can see from the data on the screen that she is a young adult. The mother explains that the daughter has appealed her tax assessment, and when she received a giro for half of the amount of her outstanding tax some weeks later they both had believed that her complaint was granted and that a compromise was settled. When she recently received a second giro with the same amount both mother and daughter started to think that perhaps the complaint had not been granted, perhaps it was not even handled yet. The mother tells that the daughter had to borrow money to pay the first tax giro, and that she cannot afford the second one.

The daughter has not received any reply letter from the tax office so the mother complains that the case handling is far too slow. She asks how long time it will take before her daughter receives a reply to the complaint. The advisor informs her about the routines and time limits that govern the agency's complaint handling, and it becomes clear that the agency is well within the time limits in this case. The advisor explains the routines, which say that the daughter will have to pay the outstanding tax independent of the handling of the complaint. If the complaint is granted she will get the money refunded from the tax collector next year.

The mother claims that the outstanding tax is a result from the daughter being ill for a period last year: The illness is the main argument in the complaint. The daughter also has claimed deductions because of commuting from home to work. The mother says that the Tax Agency is unreasonable because her daughter does not have so much money and the agency is too slow in settling the case.

The advisor asks if her "daughter's address in the Population Register is correct" because the tax office reply letter could have been sent to the wrong address. The mother tells the advisor that the daughter has moved from home and gives him the new address. This is not the same address as listed in the Population Register. The advisor does not tell her this, instead he asks if the daughter has had more addresses. The mother mentions another address, which also is different from the one listed in the register. They talk about addresses for a while without the mother (or the advisor) mentioning the one registered.

The advisor retrieves the complaint from the electronic archive. It appears that the daughter has used the electronic service for complaining. The advisor is in doubt whether the daughter has filled in the online appeal form correctly and completely, but he does not tell the mother. He says to her "I cannot tell you everything", and adds that a possible reason for the daughter not having received a reply could be that a letter from the tax office asking for documentation of the claims had not been received if the address registered is not the correct one, and thereby documentation may not have been provided by the daughter. He tells her to check with her daughter that she has registered the correct address in the Population Register and tell her that she might need to provide documentation for her claims in the complaint.

This example is more complicated than the previous one. The tax rules are still clear and unambiguous but in this case the tax advisor can neither find a root of the problem nor fix it. One reason is that the advisor cannot disclose all data he can find in the registers to the mother because of privacy concerns, since the daughter is of full age and legal capacity: There can be many reasons why a young daughter would not want to tell her mother her registered address, in addition to forgetfulness by the daughter from having moved several times. The advisor cannot know which is the case, and he cannot ask the mother directly. The sorting out of the mothers' complaints requires some knowledge of the rules and regulations involved, made complicated by IT-systems' strict behaviour and the privacy concerns from the advisor. The advisor could only help the mother by indicating some steps she can take to start sorting out the case.

3.3   A newly immigrated citizen needs a tax card

A Norwegian man is calling. He starts by telling that he has married recently and is calling on behalf of his wife. She has recently immigrated from a foreign country, and has received a national identification number. He asks if she can get an Exemption Card, so that she will not have to pay tax if the income is below the no tax threshold. The advisor says that he can send her a paper form to fill in. The caller asks if she can start to work before she has received the card: "yes, she can", the advisor says, these things are independent.

The caller tells the national identity number of the wife, and the advisor looks her up in the Population Register, where he sees that she is listed with a daughter also with a foreign name. The advisor explains that the wife cannot apply for an Exemption Card through the simplified online service because she has not yet received PIN-codes in the mail. He tries to look her up but cannot find her in the Advance Tax Register. So even when she gets her PIN-codes she cannot apply electronically.

The advisor then creates two new records in the Advance Tax Register and enters the wife and the daughter, each with name, national identity number and address. He then prints out

a blank form, where he marks with a green felt pen the fields she will have to fill in. He puts the form in an envelope and writes the address by hand for mailing it to her, and tells that it is important that she fills out this information since they do not have any data on her.

This example turned out as easy, but could have been a lot more complicated had the advisor not been so experienced. The TICC routines say that the advisors should not be allowed to write in the Advance Tax database except in acute situations. After the call we asked the advisor how he should have handled this case if he could not create a new record in the register. He said that entering new people with blank fields is not outside the routines: no data are actually changed. But young, inexperienced advisors do not feel like using the old-fashioned command-based technology that must be used to write in the database. They instead send a request through their log system to the Regional Tax Office to which the citizen belong and ask for a new person record in the Advance Tax Database. The request will go as an ordinary e-mail and it can take up to three weeks before it is handled by the actual tax region. Without the short cut the agency would not have been ready to process any filled in form from the wife, and issue an Exemption Card.

3.4 Calls in other categories

We have also come across calls in the other categories of Table 1. The easy tax rules and easy situation call (upper left corner) normally involves the advisor informing the caller that using the web is faster—and with this information many callers choose to do that instead. Some need to be guided through the web site: The advisors know the web pages by heart and can guide the callers through their task without having access to the caller's web page (which they do not have).

Questions about complicated tax issues (upper right corner) can be handled by the advisor looking up the actual rules in a book or asking a colleague or the advisor can direct the caller to second line support through the log system, where s/he normally gets an answer within a day or two. These cases are not so common in the empirical material: only type of questions always considered complicated by the TICC advisors are questions about taxation of Norwegians staying abroad or international workers in Norway, these calls are usually directed to second line support immediately.

The last category, in the lower right corner, is one that very rarely occurs, and we have only found one example in our data material. A woman calls and asks if income from selling land property is to be taxed as "personal income" or "capital income". She owns a piece of land close to a city. The municipality is developing the area by building infrastructure for water and sewage and she is charged a part of these costs. She is living off disability pension, and has to sell some of her land to pay the costs. If the income from the sales is counted as personal income she risks losing her disability pension. If the income is counted as capital income, she risks no such thing. The caller sounds well aware of the rules for her disability pension, but does not know how the sales income will be classified according to the tax rules.

The advisor does not know the answer. He tries to look it up in a law book to see if there is a limit on how many pieces of land she can sell without a reduction of her pension. He cannot find the answer, and decides to write a note describing the question and send it to second line support. They will check up the rules and call back within 48 hours.

Depending on the answer of the question, this example fits in different corners of the table. If the sales income is counted as capital income then nothing unfavourable will be expected to happen with the woman's pension: the example fits in the *upper right corner*. If the sales income is counted as person income she risks a reduction in her pension. This can make it necessary for the caller to sell more land to compensate loss of income, hence further deductions in her pension may be a consequence. This can create several cycles of handling a complicated situation, where it is difficult (and outside the scope of this paper) to see what her possibilities for negotiation and solution will be. In this case we categorize it as an example in the lower right corner until an answer is found, and the case is settled.

4   Disentangling into imbrications

As stated above, we were struck by the fact that most phone callers' questions did not concern difficult tax problems but rather simple questions that presented themselves as a complex mix of formal, technical, social and organizational issues. We have found the notion of "entanglement" useful to describe this mix of issues that creates problems for the caller.

4.1   Levels of entanglements

In the tax setting we can use the concept of entanglement on at least two levels. The basic level is to describe and analyze tax and tax rules as entangled with the technology that is used to represent and act upon them. Tax calculations are carried out by computers on the basis of reports and numbers about taxpayers' economy from other computers in banks, public services (e.g. welfare and pension), insurance companies and employers. When there are no irregularities, or no particular incidents happen that affect a taxpayer's economy, tax will be deducted, paid and reported automatically. However, at this analytical level we also find other public systems that have information needed for or affecting the tax. A taxpayer has a name and address as well as a unique national identification number, and this information is found in the Population Register – which acts as a reference base for correct information. Some welfare payments from other agencies qualify for reduced tax while others are seen as income and therefore taxed. Everyone has the right to earn a minimum without paying tax (with an Exemption Card), but if you earn more you have to pay tax from the whole amount. Single parents are entitled to pay less tax than co-habiting parents (so-called Tax Class 2), and so on: The tax system is based on a number of rules where different public systems and their information are intertwined and integrated.

The second level of entanglement concerns how the technical-formal entanglement is intertwined with the personal and social. Tax is a way in which society organizes that all citizens and users of the welfare state also contributes in paying for the services – depending on their income and economy rather than on what each person make use of. Every person living and working in the country is therefore a potential taxpayer. For the taxpayers, however, tax affects their personal economy and is therefore intertwined with all other aspects of their lives

that depend on their economy – which in our society are most things. A constituent of an entanglement might well be another entanglement.

A tax issue can be experienced as an inextricably impossible knot, hence the services that TICC (and other public service providers) offer is crucial in order to open such knots and point to possible actions that will solve the problems for the citizens. It seems useful to look at the work of the TICC advisors as disentangling the tax entanglement for and on behalf of citizens and taxpayers. To be able to analyze how the advisors help the callers we need a notion of *disentangling*.

4.2 Imbrications can be disentangled

Disentangling can be done in many different ways – as demonstrated in the examples from TICC. Some entanglements are more complicated to disentangle, if at all possible. We suggest a second concept for talking about entanglements that are possible to disentangle: "imbrications". Imbrications are introduced by Leonardi (2011) and refer to:

> "the interweaving of human and material agencies … To imbricate means to arrange distinct elements in overlapping patterns so that they function interdependently. The verb 'imbricate' is derived from names of roof tiles used in ancient Roman and Greek architecture. The tegula and imbrex were interlocking tiles used to waterproof a roof. The tegula was a plain flat tile laid on the roof and the imbrex was a semi-cylindrical tile laid over the joints between the tegulae.". (Leonardi 2011, p. 150).

Figure 1. Roof in Port Grimaud

Leonardi suggests seeing human and material agencies as imbrications producing routines and technology, where "those agencies are weaved together to produce empirically distinct figurations" (Leonardi 2011, p. 9] in different ways.

> "Thus, sometimes, human and material agencies interweave in ways that create or change routines, and other times, they weave together in ways that produce or alter technologies." (Leonardi 2011, p. 10).

The concept of imbrication suggests that it is the interweaving of the agencies that produce the result, and the result maintains that there is a difference between the two. We understand

Leonardi's description of an imbrication to refer to something where the elements are visible or available as distinct, and can be handled separately from each other as well as from the imbrication as a whole. The "overlapping patterns" of human and material agencies indicate that a stepwise procedure will be suited to disentangle them. The disentangling itself will make a difference. In this way the notion refers to patterns or durable results of earlier imbrications ("organizational residue" (Leonardi 2011, p. 10)). These results can stay and act as conditions for further imbrications "though in a non-deterministic way" (Leonardi 2011, p. 13). In this way imbrications constitute what Star and Ruhleder (1996) call infrastructure, providing conditions for (further) actions.

We suggest that the notion of *imbrication* refers to an entanglement that can be disentangled by a stepwise sequence of choices and actions, where the understanding of how the elements are woven together makes a basis for (or points to) steps of actions, or addresses them separately and still as a part of a complex interplay.

Disentangling can enable action by making visible the "tegula" and the "imbrex", and thereby uncover where the holes in roof are. The space for finding a solution gets wider when we can identify the "tegula" and "imbrex" of the imbrication. Disentangling that enables action can involve filling in a gap similar to filling in a missing tile of the "tegula" or the "imbrex" in the roof. We apply a design perspective when looking for openings to improve a situation and make a better solution: The aim of design is to see how things could be otherwise, and to make the necessary changes.

Disentangling will imply changing the understanding of an entanglement into that of an imbrication, where it will be possible to become aware of and see the different agencies producing the result. This will open up a space for negotiation, choice, action and change.

4.3   Types of disentangling

The examples in section 3 illustrate that the formal, technological and social are intertwined and that clear causal relationships are difficult to establish. However, there are fundamental differences between the types of entanglements and these differences can point to useful distinctions for addressing them—and for disentangling—with far-reaching consequences for human autonomy. Going back to table 1 we see that the four types of situations illustrate different kinds of entanglements that need to be handled in different ways:

1. *Easy tax rules and easy to handle context:* the entanglement is addressed as an imbrication from both the taxpayer and the TICC side, where the taxpayer cannot see what s/he can do to change the situation and TICC provides guidelines for action. With the roof metaphor we can say that the roof is seen as "missing one of the tiles" and that TICC explains how to repair the hole. The tax web site could have been used by the taxpayer to "provide the missing tile".

2. *Easy tax rules and complicated context:* The entanglement is mainly due to a mix of social and technical issues on the taxpayer side. The three calls we refer in section 3 belong to this category. It seems that the disentangling carried out by the TICC advisors aims to reduce the complexity to an imbrication of social and technical issues where the TICC

advisor either explains to the taxpayer what s/he has to do to correct what is wrong or provides the missing parts for the imbrication to work as a whole. In some situations the TICC advisor leaves it to the taxpayer to do his/her part, in other situations the TICC advisor carries out some of the steps (fill gaps or "create missing tiles") until the taxpayer can do the rest him/herself. The explanation of the composition and workings of the imbrications and the decision on how much of the work can be left to the taxpayer varies from advisor to advisor: Some seem more reluctant than others to help with the socio-technical disentangling the taxpayer side.

3. *Complicated tax rules and easy to handle context:* This category addresses entanglements in the Tax Agency side of things (at level 1) and must be disentangled by tax specialists. This disentangling is based on legal expertise and can be compared to the making of a "missing technical/regulatory tile". In this case the Tax Agency tries to find out if and how the taxpayer fit to their representational categories and which of these categories s/he matches.

4. *Complicated tax rules and complicated context:* This category is a real knot where the tax problem is inseparable from the social problem. Like in category 2 the Tax Agency works with making a match between a citizen and the formal-technical categories (is the women a social welfare client or a worker?). The difference here is that the person-representation relation is intertwined with a socio-technical entanglement on the taxpayer side. The knot can probably not be disentangled within the Tax Agency alone – and certainly not during the phone call – as it involves the intertwining of at least two levels of entanglements as it presents itself to the taxpayer: the representation of the taxpayer as a worker or a social welfare client after performing the act of selling property (which is neither social welfare nor work) is deeply intertwined with her economy and social rights (e.g. right to social welfare) in the short as well as in the long term. This entanglement is not possible to dissolve into simple constituents and see as an imbrication, maybe because there are layers of entanglements on both the tax side and the personal/social side of the situation. Attempts at disentangling can uncover other entanglements as constituents.

If second line support concludes that the income from selling land in this case should be seen as person income, there will be little space for action by the Tax Agency for improving the situation. Neither the tax advisor nor the caller can create this space alone: It will not be possible for the tax advisor to find a solution and change the situation into a more favorable one for the citizen. Our empirical material does not include examples of how this situation could be handled to help the citizen, who risks being spiraled into an unhappy economic development where the more land she sells to cover costs, the more she lose of her pension, so she will need to sell even more land, loosing more pension. Possible ways of changing this situation could be for her to write a complaint to the Tax Agency or the Welfare Agency, ask for a change of the laws regarding sales of property, petition the municipality and ask for lower costs, but this will be out of the scope of this paper. We can see that she has some possibilities for action, but the result is dependent on the good will of people outside of TICC for her situation to improve.

Conditions for autonomy in the information society • 65

Tax rules Contexts	*Easy*	*Complicated*
Easy	Imbrication: pointing to a "missing tile" in the roof.	Imbrication for taxpayer, entanglement on the tax side.
Complicated	Entanglement on taxpayer side. TICC disentangles into imbrications providing steps for providing "missing tiles"	Inseparable interdependencies between level 1 and 2 entanglements. Not possible to disentangle into imbrication.

Table 2. Entanglement types and disentangling strategies at the time of the call

5   Between the entanglement and the imbrication

The literature discusses sociomateriality with a focus on the entangled nature of material/technical and human agency. This focus is fruitful in a theoretical discussion of social or technological change in that it gives a role for all kinds of agencies and influences. When explaining social change (Orlikowski 2007, 2010) or the development of scientific theory (Pickering 1995) we cannot separate human from material agency. However, the mundane practices of supporting citizens' autonomy trying to get callers to understand the issues and choices as well as the possibilities for action seem to be best described as acts of disentangling. Disentangling an entanglement into an imbrication makes visible the scope of possible actions for changing an unfavorable situation. This does, however, require competencies and some analytic capabilities not granted to everyone.

TICC offers their callers exactly this: by analyzing the situation as described by the caller and giving advice about what to do the advisors disentangle the sociomaterial knot. In order to act autonomously one has to know where to start acting and which acts to choose.

We have used the metaphor of the roof made of tiles (of tegula and imbrex) to illustrate the notion of an imbrication to be understood as consisting of distinct elements arranged in an overlapping pattern. The distinct elements – the different tiles – are still visible for those who are trained to see them, as in figure 1. They might be handled individually when the roof is to be changed or repaired.

Disentangling is work and implies some agency. Between the entanglement and the imbrication there is work—and sometimes a lot of work is necessary for successful disentangling. In our case human agency is doing the disentangling, but we might as well imagine disentangling by non-human agency.

5.1   Sociomaterial entanglements

Orlikowski (2010) concludes that "all practices… are always configured by some specific socio-materiality" and that "we must study the dynamic and multiple sociomaterial (re)configurations as these are performed in practice" (Orlikowski 2010, p. 137). Furthermore, "a perspective that renounces the categorical presumption of separateness is likely to offer a more useful conceptual lens with which to think about the temporally emergent sociomaterial realities that form and perform contemporary organizations" (Orlikowski 2010, p. 137). However, she also acknowledges that technological specificities can influence the social in different ways: "different technological capabilities […] will have particular effects" (Orlikowski 2010, p. 137).

In order to address "the different technological capabilities" within a sociomaterial perspective we argue that we need to be able to talk about the analytically separable constituents of the entanglement. Discussing the constituents will enable us to identify which constituents can be designed differently so that the sociomaterial assemblage as a whole can be changed in a wanted direction. Confronted with the emerging outcome of a sociomaterial assemblage it can be difficult to see the openings for change and improvements. However, to be able to act out a need for change is an important aspect of autonomy.

Many aspects of the information society present themselves as sociomaterial entanglements. Public services are delegated to various sociotechnical assemblages that carry out the services, often hiding the technical complexity of the assemblage from the public for the sake of making the service easily accessible. However, for the citizen the eGovernment façade may appear so smooth that it does not give any indication of whether it hides a real entanglement or an imbrication that can be handled in steps by the stakeholders of the service.

The notion of disentangling refers to the process of analyzing and describing a sociomaterial entanglement in its constituents. Disentangling will imply making an "agential cut" (cf., Barad (1999)), to separate the agencies that contribute to the problematic situation. This will make it possible to see through the entanglement and get a grip on the possibilities for action. Facing an entanglement seems impossible, facing an imbrication can enable action. Imbrications that are presented as entanglements not opening up for action seem to counteract the idea of a democratic information society. The "threads" of the knot must be sorted out, so we instead can understand the entanglement as "tiles" to be handled in a sequence instead of all at once. We can compare disentangling with reverse engineering of the outcome of an assemblage, aiming to identify the source of the problem and try to opt for some other outcome. In this way human agency can arrange material agency so that a more wanted outcome is possible.

5.2   Disentangling for autonomy

We argue that it is important for human autonomy to be able to act in complicated situations where autonomy is challenged. The sociomaterial assemblage of tax needs to be opened up for detailed scrutiny in order for the taxpayer to understand the material agency of some of its constituents. If a tax issue does not work well or the tax context changes, all taxpayers will need to know about legal, economical or technical details in order to assess what is beneficial for themselves and act upon this knowledge. Knowing (to some degree) how the entanglement of law

and technology works will make it possible to analytically separate human and material agency, and by disentangling change the view of the technology from an entanglement to an imbrication. This will open up for an understanding of if and how a dire situation can be changed, helping a user to go from seeing the situation as "so overwhelmingly difficult as to seem impossible" (Rose and Jones 2005, p. 29) to a more empowered position.

Getting things done for you by others and being able to do things yourself can be seen as different interpretations of autonomy. In many ordinary tax questions the autonomy of the taxpayers can be increased by teaching them to help themselves. This will give them a better basis for the yearly tax cycle with tax card, tax return form and tax assessment. However, if the taxpayer experiences difficulties in understanding the tax rules and calculations or in using the online services, s/he will be better off by getting the services carried out by the tax advisor on the phone. The caller needs the help of the tax advisor for disentangling as well as for carrying out some of the actions.

Seeing sociomaterial assemblages as inseparable, unsolvable entanglements can lead the citizen to give up, and not make any move towards disentangling. We have reported some cases where a simple tax issues becomes a problem and seems to leave no openings and is too complicated to handle for a taxpayer. This leaves less space for action and change, which can reduce the citizen autonomy: The situation can stay less satisfying or the citizen will not experience any learning that can increase the possibilities for doing better next time. If you see a problem as an entanglement, your only options are to accept or not accept: There is no space in between for negotiation and improvement. The notion of entanglement is useful for understanding the "user experience" for the taxpayers calling in to TICC. However, we also need the concepts of disentangling and imbrications in order for us to talk about space for action and of the possible actions in that space.

By disentangling the tax questions together with the callers the advisors help reducing the complexity of the tax issue: They "translate" the problem from an entanglement to an imbrication, where steps can be taken to address or even solve the issue. Seen as an imbrication, as something that can be analytically separated into human actions and legal/formal/technical issues, a space for action is opened. Seeing the problem as an imbrication opens up for compromises, action and change. Being able to govern oneself – to address one's problems and change an unfavourable situation is essential for the autonomous citizen. To not be able to change an unfavourable situation means to reduce the citizen autonomy – not in line with a well functioning democracy.

6 Conclusions

In this paper we have used empirical data from the Tax Information Call Center (TICC) to discuss how a public service can support citizens' autonomy. Our basis for the paper has been empirical: We have analyzed empirical data from the practical use of a public service as to understand how and what are experienced as difficult by the users of that service. We have also worked theoretically with concepts that can be used for talking about the intertwining of social, technical, formal (tax rules), and organizational (organization of work in the Tax Agency and TICC)

elements of a situation: the notion of sociomaterial entanglement. Sociomaterial entanglement has been used to point to the inseparability of the social and the technical (and material) in our lives.

Based on this view, we have suggested a concept for disentangling that will help us to act and change a difficult situation. Some entanglements are not inextricable and the concept of imbrication gives us a language for describing a space for action We find it important to be able to disentangle an entanglement into its constituents in a difficult situation: only then will we open a space for negotiation, choice, action and change – and for autonomy. We have put emphasis on explaining the disentangling and have introduced the notion of imbrication to characterize entanglements that are possible to analytically separate into the social and the technical and by indicating a process of addressing the elements of the imbrication (the "tiles") one by one in a sequence. The paper discusses how the tax advisors help the taxpayers to help themselves by changing entanglements into imbrications, as a step towards more autonomy.

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74 • Bratteteig & Verne