IS A TAXIMETER A GUARANTEE OF HONESTY OR A BARRIER TO ENTRY? EXPLORING TECHNOLOGY DISCOURSES AS CONSEQUENCES OF POLICY AMBIGUITY

Arto Lanamäki  
*University of Oulu, arto.lanamaki@oulu.fi*

Karin Väyrynen  
*University of Oulu, karin.vayrynen@oulu.fi*

Netta Iivari  
*University of Oulu, netta.iivari@oulu.fi*

Marianne Kinnula  
*University of Oulu, marianne.kinnula@oulu.fi*

Leena Ventä-Olkkonen  
*University of Oulu, leena.venta-olkkonen@oulu.fi*

---

**Recommended Citation**  
https://aisel.aisnet.org/ecis2019_rp/55

---

This material is brought to you by the ECIS 2019 Proceedings at AIS Electronic Library (AISeL). It has been accepted for inclusion in Research Papers by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.
IS A TAXIMETER A GUARANTEE OF HONESTY OR A BARRIER TO ENTRY? EXPLORING TECHNOLOGY DISCOURSES AS CONSEQUENCES OF POLICY AMBIGUITY

Research paper

Lanamäki, Arto, University of Oulu, Oulu, Finland, arto.lanamaki@oulu.fi
Väyrynen, Karin, University of Oulu, Oulu, Finland, karin.vayrynen@oulu.fi
Iivari, Netta, University of Oulu, Oulu, Finland, netta.iivari@oulu.fi
Kinnula, Marianne, University of Oulu, Oulu, Finland, marianne.kinnula@oulu.fi
Ventä-Olkkonen, Leena, University of Oulu, Oulu, Finland, leena.venta-olkkonen@oulu.fi
Laari-Salmela, Sari, University of Oulu Business School, Oulu, Finland, sari.salmela@oulu.fi

Abstract

Information Systems (IS) researchers have become increasingly interested in policy. Government policy enables and constrains the range of technologies operating on the market. In the spirit of enabling innovation, governments around the world have moved to the principle of technological neutrality: regulating goals instead of specific technologies. In this paper, we focus on the legislative context of the Finnish taxi industry. Finland’s previous legislation mandated all taxicabs to be equipped with a taximeter, while prohibiting other vehicle classes from using it. Finland’s recent deregulation reform The Act on Transport Services adopted the principle of technology neutrality and thus introduced deliberate ambiguity into legal text. This ambiguity leaves room for different stakeholders to construct their own interpretations. For this paper, we conducted 19 interviews with five stakeholder types in the Finnish taxi industry and related regulatory bodies: legislators, legislation implementers, new entrants, incumbent taxi industry, and incumbent technology providers. We found how policy ambiguity opened a plethora of contesting discourses about what this seemingly mundane technology is for. We depart from the mainstream conception of policy, which views policy as a “best practice” that can be easily transferred across contexts. Instead, we call for more attention to policy ambiguity, multi-stakeholder policy contexts, and conflicting power interests.

Keywords: ambiguity, policy, discourse, taxi industry, taximeter, technological neutrality.

1 Introduction

Policy considerations have been part of Information Systems (IS) research for quite some time (Keen, 1980; Zuboff, 1982; Majchrzak, 1984). Information privacy researchers have studied the relationship between governmental policies and free-market corporate self-governance (Milberg et al., 2000) and health care IS researchers have studied implications of policies and regulations (Jensen and Aanestad, 2006). Recently, IS researchers have got even more aware of the importance of policy (Majchrzak and Markus, 2013; Niederman et al., 2017; Clemons and Wilson, 2018). Significant societal consequences result from contemporary phenomena such as sharing economy and digital transformation (Vial, 2019), for instance in the context of taxis and ridesharing (Shaikh and Sia, 2018). Majchrzak et al. (2016) recommend that “IS researchers interested in societal and business change should couple research findings with public policy and regulation recommendations where relevant.”

Much of IS research treats policy as a singular entity. Policy is often viewed as a “best practice” that
once identified can be transferred into other contexts. There is little IS research on policy processes and consequences, even though policy surrounds with these complex phenomena (Matland, 1995; Scollon, 2012). It is rarely the case that everybody wins once they conform with policy. Instead, policy may involve controversy and struggle. IS researchers have put little attention to multiple stakeholder policy contexts involving conflicting interests, even if such contexts definitely shape IS development and use. For instance, the meaning-making around the European General Data Protection Regulation is one such context (Grundstrom et al., 2019). Moreover, policies are not often formulated specifically, leaving room for multiple interpretations. Ambiguous policy-making should be better acknowledged by IS research.

In this study, we address the consequences of the ambiguous policing in the context of the taxi industry in Finland. When collecting data for our long-term research program on the digital transformation of the taxi industry (e.g., Väyrynen et al., 2018), we noticed how various stakeholders emphasized the significance of the taximeter regulation. Taximeter is a standardized and legislatively specified class of technology in many countries, including the context of this study, Finland. Taximeter is an IT artefact (Orlikowski and Iacono, 2001), entangling digital and physical elements. Before the deregulation in Finland in July 2018, a taximeter and its functions were very tightly defined. The new Finnish Act on Transport Services leaves its definition more open. As our research question, we ask: How do different stakeholders respond to ambiguity embedded in policy statements concerning taximeters? We examine ambiguous policy by analysing interviews of key stakeholders affiliated with the Finnish taxi industry and its surrounding institutions. We adopt a Foucault-inspired discursive approach, positing reality as materially-discursively constituted (Hardy and Thomas, 2015; Putnam, 2015).

The paper is structured as follows. Next section introduces related research on ambiguity in policy implementation as well as our theoretical lens on discourses. Section three presents the research design including the procedures of data collection and analysis. Section four outlines the empirical findings while section five concludes the paper by summarizing the results, discussing their implications, and identifying limitations and paths for future work.

2 Theoretical lens

2.1 Ambiguity in policy implementation

IS researchers have been interested in policy and regulation issues since the beginning of our discipline (Keen, 1980; Zuboff, 1982; Majchrzak, 1984). During the last decade, policy has gained ever more importance in our field (Majchrzak and Markus, 2013; Niederman et al., 2017; Clemons and Wilson, 2018). Regardless, policy is often treated narrowly as “recommendations” (cf. Majchrzak et al., 2016), resembling the highly contested concept of “best practices” (Wagner et al., 2006; King, 2016).

Ambiguity is considered the nature of all complex organizations and their activities (Weick, 2001). It refers to the existence of multiple viewpoints (Eisenberg, 1984), or “a state of having many ways of thinking about the same circumstances or phenomena” (Feldman, 1989). Ambiguity is exercised for example in the legislative drafting of directives of the European single market, under the banner of technological neutrality (Koops, 2006; Kamecke and Korber, 2008). The European Parliament and the Council requires their member states to adopt the technology neutrality principle in market regulation, “that it neither imposes nor discriminates in favour of the use of a particular type of technology.”

In policy implementation literature, intentional policy ambiguity is seen to provide various benefits. Ambiguity may here regard either means or goals, and it can be used for numerous reasons (Eisenberg, 1984; Jarzabkowski et al., 2010). The ambiguity of means may occur, for instance, in situations where

---

the technology needed to reach a policy’s goals does not exist, or the division of labour is not clear (Matland, 1995). Intentional goal ambiguity allows “divergent interpretations to coexist” and “diverse groups to work together” (Eisenberg and Witten, 1987), to promote a unified diversity in organizations (Contractor and Ehrlich, 1993), and to facilitate organizational change (Eisenberg et al., 1993). Difficult issues are easier handled when people need only agree on principles, not details (Eisenberg, 1984; Paul and Strbiak, 1997). Ambiguity in policy text can also help overcoming value dilemmas (Tracy and Ashcraft, 2001). It has been shown to limit conflict, and it is often a prerequisite for getting new policies passed at the legitimation stage (Matland, 1995). Ambiguity allows multiple interpretations (Eisenberg, 2007). Ambiguity may also emerge by itself. Giroux (2006) talks about pragmatic ambiguity: a specific initiative may result in different interpretations and multiple courses of action.

Ambiguity has its drawbacks. Too much ambiguity can lead to confusion (Soneshein, 2010; Liu et al., 2018), resistance (McCabe, 2010) or avoidance of responsibility (Denis et al., 2011). “Escalating indecision” has been reported, regarding repetitive cycles of decision-making without action by stakeholders with divergent views (Denis et al., 2011). Ambiguity can also have an enabling effect at first, but later turn into a dissolution of strategic discourse (Abdallah and Langley, 2014).

As to ambiguity in the context of our study, taximeters have been a feature of taxicabs in Finland since the beginning of the taxi industry in 1906, and they became mandatory in 1962 (Mauranen, 1995). Since 1990s, taximeters are no longer mechanic devices, but digital computers that measure the trip and facilitate payments. The government regulates taximeters with several legislative acts, of which the Vehicles Act is the most important. The Vehicles Act read from 2002 to 2017 as “A vehicle of category M1 used in passenger transport requiring permit shall be equipped with a taximeter. Other vehicles shall not be equipped with taximeters.” The spirit of this formulation was specific and restrictive, mandating all taxis to use a taximeter, while preventing other vehicle classes from using it. The recent deregulation reform resulted in a technology-neutral reformulation of the Act. The new Act is ambiguous, as it aims to maintain compliance with the EU’s Measuring Instruments Directive, while following a laissez-faire principle allowing the markets to decide what constitutes a taximeter:

“According to a requirement that applies to all taxi transport services, if the price of the journey is based on measuring the distance or time, a vehicle must have a taximeter, or some other device or system with which a similar level of measurement accuracy and standard of data protection can be achieved.”

### 2.2 Discourse lens

We focus on the discourses that emerged after the above mentioned ambiguous legal text was formulated. To study the interpretations of what “a taximeter, or some other device or system” is and does, we utilized a Foucault-oriented discourse lens. Such a lens has been utilized in IS research extensively to understand technology design and use (Alvarez, 2002; Livari, 2010; Hekkala et al., 2014; Livari et al., 2015). These studies foreground many power related issues – domination, oppression, resistance and empowerment around technology design and use. We think this lens is highly suitable in the case of taximeter and public policing around it, with various interesting developments related to these phenomena are currently on-going in the society and government. Various actors are trying to influence how taximeter is seen, used and defined. It is not yet obvious who are the ones in the position of power, who are the oppressed ones, who is resistant and towards what, and who is to be empowered. The situation was continuously evolving at the time of writing up this study. Due to this, we think our study provides IS research a highly exciting and novel setting to address societal and government level IS topics that engage a wide variety of stakeholders with vested interests, while it currently being in the state of flux whose interests end up as being served and how. So far, IS research has neglected such policy making complexities at the societal level.

---

Discourse lens following Foucault (1972) sees discourses as practices systematically forming the objects of which they speak. They compete to disseminate preferred understandings of the world. It is important to acknowledge that meanings are constructed in discourses to serve particular interests. (Foucault, 1972; Weedon, 1987). Hence, in the analysis of discourses, it is essential to ask: who is speaking, who has the authority to use this language, who is qualified, who has the right to speak, ability to understand, access to the statements and capacity to invest discourse in decisions, institutions and practices? These rights and abilities are limited. (Foucault, 1972; Foucault, 1980)

Subjectivity is another central concept within this lens that refers to the ‘individual’s sense of herself and her ways of understanding her relation to the world’; it refers to the positions with which we ‘structure our sense of ourselves’ (Weedon, 1987, pp. 32-33). Foucauldian perspective assumes subjectivity to be fragile, contradictory, and constantly constructed in discourses. Forms of subjectivity are historically produced and there are always competing forms available (Weedon, 1987; Hall, 1997; Weedon, 2004). Discourses offer individuals these forms of subjectivity through subject positions that must be occupied while participating in discourses (Foucault, 1972; Foucault, 1980; Weedon, 1987). People are continuously persuaded to become subjects in discourses that constitute individuals as subjects of a certain kind. However, the persuasion of individuals as subjects is never final, but continuous and open to challenge. People do not only adopt discourses and subject positions offered in them, but discourses can also be questioned and challenged (Weedon, 1987). However, some discourses are more readily available and more influential than others, while access to some discourses might also be limited to only certain individuals (Foucault, 1972; Foucault, 1980; Weedon, 1987).

Recently, it has been argued that materiality should be better acknowledged in the discourse perspective. The focus should be broadened to material-discursive practices that produce, make, configure, and reconfigure reality (Barad 2003, Orlikowski and Scott 2015, Putnam 2015). The Foucauldian approach focuses primarily on the power of language (Barad, 2003), even though Foucault (e.g. 1972, 1980) did acknowledge materiality to some extent—viewing discourses as shaping and regulating our conduct and bodies, as well as objects, spaces, and material practices (see Hardy and Thomas 2015). We acknowledge that Foucauldian approach is relatively weak in addressing materiality: in acknowledging the ‘entangled inseparability of discourse and materiality’ (Barad 2003; Orlikowski and Scott 2015, p. 699). In our analysis we nevertheless acknowledge this entanglement by attending to how reality is produced and made within material-discursive practices (Barad, 2003; Orlikowski and Scott, 2015).

All in all, in this study we examine how “taximeter” is discursively constructed in the interview talk of several stakeholder groups. We study the material from the perspective of what kind of an object the taximeter is made to be, what kinds of discourses are produced and reproduced by the interviewees in situ, what functions the discourses exercise, and what positions can and must be occupied by individuals to be subjects in these discourses (cf. Foucault, 1972).

3 Research methods and materials

In this exploratory study, our rich data consists of 18 semi-structured interviews (Myers and Newman, 2007) we conducted with 19 interviewees. All the interviewees represent central stakeholders in the Finnish Taxi industry and its surrounding governmental and technological institutions. These stakeholders represent five categories (Figure 1). Interviews lasted between 39 to 143 minutes. The recorded audio totals about 25 hours. We applied purposeful sampling (Morse, 1991) when selecting our interviewees.

We, the authors of this paper have backgrounds in discourse studies, IS, and management research. The data analysis was a collaborative process. First, the interview transcripts were read through several times. All relevant pieces of text addressing the taximeter were located and saved for deeper analysis. Then, each snippet of text was examined in collaborative data analysis sessions. We asked various questions: what kind of object the taximeter was made to be; what kind of discourse on taximeter is being produced or reproduced; what functions the discourse exercises; and what position is occupied by the informant when producing and reproducing the discourse. In the third phase, after identification of the variety of meanings associated with the taximeter and its associated discourses and subject positions,
the identified discourses were compared with each other. During this examination, the general approach towards the taximeter held by the speakers was identified in the discourses as neutral, positive, or negative (see Table 1 in Section 5.1). After identification of the discourses, we identified five common themes around which these discourses revolved (see Table 2 in Section 5.1) as well as aspects indicating the entanglement of discourse and materiality in this case.

Figure 1. 19 interviewees organized under five stakeholder categories.

4 Taximeter discourses as reactions to policy ambiguity

The Finnish Act on Transport Services was signed on 24 May 2017 and took effect on 1 July 2018. During the year from signing to enacting the law, divergent interpretations emerged of its ambiguous formulation, particularly related to regulation of taximeters and what does “a taximeter, or some other device or system” mean. That leads to questions of what qualifies a device or a system to be comparable to a taximeter, and what a taximeter is for. Through applying a discursive lens, we identified fifteen discourses related to the traditional taximeter (D1-D15). We present these discourses in relation to the type of stakeholder: legislator, legislation implementer, incumbent taxi industry, incumbent technology provider, and new entrant. With legislator, we refer to the Finnish Ministry of Transportation and Communications, which has written the new transportation legislation. The legislation implementers are those governmental organizations that are responsible for overseeing the legislation and putting it into action. Figures 2-6 and Table 1 (in Section 5.1) summarize the discourses that arose. Quote references (Q1-Q23) in each section refer to the Figure that is presented in the respective section.

4.1 Legislator discourses

Due to the paradoxical aim of the reform to comply both with the EU’s Measuring Instruments Directive and the demands of the markets, ambiguity emerged. This ambiguity is partly result of the actions of the legislators who have wished to increase flexibility to allow innovations to emerge. Thus, focus of the regulation has moved from specifying means to describing goals. Ambiguity is also a natural result from the paradox as the goals are contradictory.

In the ‘taximeter as not technologically neutral’ discourse (D1), the legislators position the traditional taximeter and earlier legislation as too restricting: hence, they address them in negative tone. In the previous version of the legal text, all taxi drivers had to have a taximeter. The regulation is loosened so that a taximeter is needed only if price of the journey is based on distance and/or time. The basic principle is that law should be technology neutral and this is now better achieved. However, compromises are always needed between flexibility and accuracy (Q2). This discourse indicates that ambiguity of the
law is acknowledged if not even intentionally introduced by the legislators (see Q1 and Q3). The situation overall seems ambiguous and nobody seems to want to take responsibility. Thus, the legislators state: “We have now regulated the law and Trafi [Finnish Transport Safety Agency] gives further instructions. It’s now up to Trafi to take care of this.” The legislators would follow up on how others interpret the law but were not enforcing any particular interpretation. (Q4)

The legislators were also associated with the ‘taximeter as a replaceable technology’ discourse (D2). This discourse focuses on the technological capabilities between the taximeter and its alternative technologies – mainly app-based services relying on GPS positioning technologies à la Uber (Q6). Interestingly, one legislator said that it was in fact Uber that had informed the legislators about the technological alternatives and how such reforms were done in the United States (Q7). This legislator strongly believed that GPS-equipped mobile phones provide the same measurement accuracy as taximeters do.

4.2 Legislation implementer discourses

While the legislators framed taximeter largely as an obstacle to innovation, the implementers of legislation outlined several benefits for taximeters. Taximeters were seen to support proper accounting. When using a taximeter, it was assumed that taxi entrepreneurs would better comply with tax payment. The implementers viewed taximeters as more reliable and validated tools in comparison to GPS/software-based mobile alternatives. An official taximeter was also seen to ensure legal compatibility.

---

3 Since 1 January 2019, the agency is called Traficom: Finnish Transport and Communications Agency.
The discourse on ‘taximeter as supporting accounting for the driver/owner’ (D2) emphasizes the central role of the taximeter for the accountancy of financial information of the driver and the taxi company (Q8). According to the law, the taxi entrepreneur must explicitly separate for each taxi vehicle the amount of professional driving, unprofitable professional driving and personal drives. This is necessary for proper tax payment. The taximeter supports in providing this information (Q8).

The taximeter was also viewed as means for controlling tax paying in the ‘taximeter as a device of control’ discourse (D4) and, thus, prohibiting a black economy to develop (Q9). Taximeter systems collect and store data about all trips. This information can be used for control, especially by the Finnish tax administration in case of suspected tax avoidance. In addition, digital payments are common already now in Finnish taxi culture, and guides towards legal compliance (Q10). The taximeter is seen also as a reliable and validated metering device (D5). In comparison with other technologies, e.g., the ones of Uber, the taximeter was considered more reliable, as it must be officially calibrated (Q11 and Q12).

There seems to be ambiguity on the level of laws in a wider spectrum, captured in the ‘taximeter as ensuring legal compatibility’ discourse (D6). Now, “measuring device directive, measuring device law, transport service law and vehicle law are in conflict” (Int 15). The vehicle law says that when the pricing of the travel is based on measuring the time or the distance in real time, one must use a taximeter or corresponding device which follows the measuring device directive. The taximeter was advocated as compatible with both current and future laws (Q13).

4.3 Incumbent taxi industry discourses

For the incumbent taxi industry, the taximeter is enunciated also in a very positive tone: as a source of driver’s honesty and as contributing to a positive occupational identity. However, within other
discourses it is also approached quite critically: as standing in the way of modernizing taxi cars and as a thing in the past that is technologically replaceable.

The taximeter is positioned into a significant role in ‘taximeter as a guarantee of the driver’s honesty’ discourse (D7). In this discourse advocating honesty, a taximeter logs all information about how many kilometres have been driven when the taximeter is switched on, and how long the trip lasted. Towards the end of the 1970s, the taxation office decided on taking a rather high “estimation taxation” into use for taxi drivers. Only if taxi drivers could prove that they earned less than what the taxation office assumed, they could pay lower taxes. Based on this, the taximeter was then also used as a cash register and could be used to proof the right amount of income to the taxation office. As interviewee 10 put it: “And because of this, at the end of the 1970ies the grey market disappeared from Finnish taxis.”

Taximeters are viewed as the reason why taxi drivers pay taxes (Q12). The significance of the taximeter reaches yet another level in the ‘taximeter as constituting to a driver’s positive occupational identity’ discourse (D8): it is seen to constitute a positive occupational identity for the taxi drivers and taxi companies – the public could really trust them. In many countries in Europe and around the world taxi drivers contribute to the grey market, only reporting part of their income to the taxation office. Also, there is an extremely low barrier to becoming a taxi driver, and when the natural “entry barrier” is almost zero, there must be an artificial barrier to ensure that there is at least some level of control over what happens in the industry. In Finland, taxi driver is seen as an honest occupation (Q15) – at least partly thanks to the taximeters.

Figure 4. Discourses in the incumbent taxi industry

Within the incumbent taxi industry, the taximeter is not addressed in a positive tone only, however. One critical perspective brought in by the incumbent taxi industry actors was related to the costs of the taximeter. The taximeter itself costs around 1000 euros. One responder pointed out other costs involved with the taximeter (Q16). In the ‘taximeter as barrier to renewal’ discourse (D9), costs associated
with the taximeter are seen to inhibit the renewal of the taxi fleets. Critical voices around the taximeters also positioned it as an old-fashioned technology in the "taximeter as a replaceable technology" discourse (D10). Some incumbent taxi industry players positioned the possibilities of modern technology to replace the taximeter. Thus, the taximeter was positioned as a "thing of the past" (Q17).

4.4 Incumbent technology provider discourses

From the incumbent technology provider’s perspective, the discourses were again very positive: the taximeter is constituted as an affordable device and as ensuring compliance with the law and taxation.

Within the ‘taximeter as an affordable device’ discourse (D11), the incumbent technology providers emphasized that all stakeholders who were involved in progressing the new Act on Transport Services – except the parliament/congress – wanted to leave out any mentioning of a taximeter from the Act due to its costs (Q18). The technology providers, however, wanted to emphasize that the costs of the taximeter are not that high (Q19). According to the incumbent technology providers, the taximeter is valuable as it ensures compliance with the law (D12). The incumbent technology providers pointed out that the “other device or system” that the Act on Transportation Services refers to still must fulfil the requirements set by the Measuring Instrument Directive 2014/32/EU, which the taximeter already fulfills (Q20). In the ‘taximeter as supporting taxation’ discourse (D13), the technology providers pointed out that a taximeter ensures taxation in a correct and trustworthy way. Related to this, the most important thing is that a measuring instrument calculates correctly, that it works in different kinds of environments, and most importantly that its memory is not destructible. This indestructibility of the memory supports taxation (Q21). Hence, taximeter is celebrated as a tool for taxation purposes.

4.5 New entrants’ discourses

The new entrants to the taxi industry offered alternative discourses, viewing taximeter mostly in a negative light. The new entrants pointed out that the taximeter is to serve the customer, but that it is also an obsolete technology, and that it is a barrier to entry in the taxi industry.

The new entrants argue that the taximeter practically is to serve the customers (D14). One of the new entrants argued that in some of the markets they operate in, the customer directly sees the price of the ride before starting the ride. In other markets, the customer is shown a price range within which the final price will fall. Hence, the main function of the taximeter is to provide the customer with safety
concerning the price. However, mobile technology enables even better customer safety (Q22, Q23).

The new entrants approached the traditional taximeter in a very critical way as being an **obsolete technology** (D15) and replaceable by mobile technology (Q24 and Q25). They also thought that taximeter is a **barrier of entry** (D16). One of the interviewees told us that the incumbent taxi industry has lobbied to ensure that the taximeter must be a separate device. He claimed that the only reason for this was to maintain a barrier to market (Q26). According to him, this barrier prevents students and part-time workers from earning extra income.

**Figure 6. New entrant discourses.**

5 Discussion and conclusions

In this paper, we addressed how different stakeholders respond to ambiguity embedded in policy statements around a technology - taximeter. Through our analysis, we identified several discourses of the traditional taximeter by five stakeholders: the legislator, the legislation implementer, the incumbent taxi industry, the incumbent technology provider, and the new entrant.

5.1 Summary of the findings

Table 1 summarizes our findings. First, the stakeholders seem to adopt a certain kind of general approach towards the taximeter in the discourses. While the legislation implementers and the incumbent technology providers have a positive approach when talking about the taximeter, the new entrants have a more negative one. The legislator does not express any greater feelings about the taximeter and has a relatively neutral approach, being aware that the regulations concerning the taximeter are ambiguous. Interestingly, while all other stakeholder types are internally consistent, the incumbent taxi industry’s discourses feature both positive and negative aspects of taximeters.
Third, we found that the identified discourses revolve around five themes: costs related to the taximeter, legislation, taxation, technology, and occupational identity (Table 2). Interestingly, most themes are addressed by several of the stakeholder groups. The speakers sometimes have a shared understanding of the taximeter (e.g. relating to taxation and legal compliance and control), while other times opposing views are expressed (e.g., relating to costs and affordability of the taximeter).

Table 1. Summary of stakeholders, taximeter discourses, explanations, and tone of discourse.

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>ID</th>
<th>Discourse: taximeter as ...</th>
<th>Explanation</th>
<th>Tone of discourse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legislator</td>
<td>D1</td>
<td>not technologically neutral</td>
<td>Legislators want to enable technological innovation by not specifying the technology.</td>
<td>neutral / negative</td>
</tr>
<tr>
<td></td>
<td>D2</td>
<td>a replaceable technology</td>
<td>Legislators see that the similar measurement accuracy can be provided by technologies other than the taximeter.</td>
<td></td>
</tr>
<tr>
<td>Legislation implementer</td>
<td>D3</td>
<td>supporting accounting for the driver/owner</td>
<td>Taximeter operates in such way that it supports proper accounting in compliance with the legislation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D4</td>
<td>a device of control</td>
<td>Taximeter is for controlling the taxpayer, storing important information, and struggling against grey economy.</td>
<td>positive</td>
</tr>
<tr>
<td></td>
<td>D5</td>
<td>a reliable and validated device</td>
<td>Taximeter is a reliable and validated device.</td>
<td></td>
</tr>
<tr>
<td>Incumbent taxi industry</td>
<td>D6</td>
<td>legal compatibility</td>
<td>As ambiguous policing has caused confusion among industry actors, the taximeter is seen as a safe way to comply with the law even after the deregulation.</td>
<td></td>
</tr>
<tr>
<td>Incumbent technology provider</td>
<td>D7</td>
<td>a guarantee of the driver’s honesty</td>
<td>Taxi drivers pay their taxes because of taximeter “surveillance”.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D8</td>
<td>constituting to a driver’s positive occupational identity</td>
<td>Taxi driver profession is a respectable occupation (compared to other countries) in Finland because taximeter helps control the industry.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D9</td>
<td>a barrier to renewal</td>
<td>Taxi owners do not buy new cars often enough because of high installation costs of taximeter.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D10</td>
<td>a replaceable technology</td>
<td>If the taximeter is kept in the regulation, then laws are made “for the past decades”.</td>
<td>negative</td>
</tr>
<tr>
<td>New entrant</td>
<td>D11</td>
<td>an affordable device</td>
<td>Taximeter only costs a fraction of the costs of the car.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D12</td>
<td>ensuring compliance with law</td>
<td>Taximeter is “the safe way” to go as it already complies with the valid EU directives.</td>
<td>positive</td>
</tr>
<tr>
<td></td>
<td>D13</td>
<td>supporting taxation</td>
<td>Taximeter is not “technology free/neutral”. Taximeter calculates distance/time correctly. Indestructibility of the memory of the taximeter specifically emphasized.</td>
<td></td>
</tr>
<tr>
<td>New entrant</td>
<td>D14</td>
<td>serving the customer</td>
<td>Taximeter provides transparency to customer (customer can be sure he does not pay more than he should), but mobile technology provides even better means for that.</td>
<td>negative</td>
</tr>
<tr>
<td></td>
<td>D15</td>
<td>an obsolete technology</td>
<td>Modern cell phones can also measure distance and time sufficiently accurately.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D16</td>
<td>a barrier to entry</td>
<td>Costs of taximeter prevent entry to the field and are a barrier to competition.</td>
<td></td>
</tr>
</tbody>
</table>

Second, ambiguity in the policy text reflects in the discourses of the stakeholders, as they emphasize different aspects in the taximeter, choosing to interpret the text according to their own interests. They indirectly refer in their discourses to the wording of the new Act which states that “[…]. A vehicle must have a taximeter, or some other device or system with which a similar level or measurement accuracy and standard of data protection can be achieved”. For example, the new entrants emphasize measuring accurately time and distance (and argue then that mobile technology can do this similarly). They thus want to make the point that the technology they are using fulfils the regulation’s “some other device or system with which a similar level of measurement accuracy […] can be achieved”. Meanwhile, the incumbent technology provider emphasizes indestructibility of the memory of the taximeter, and thus refers indirectly to the part of the new regulation that states that with this other device or system also a similar “standard of data protection” must be achieved as is achieved with a traditional taximeter. The incumbent taxi industry and the new entrants point out the high costs of the taximeter, their interest being that the taxi drivers would not have to bear the financial burden of the traditional taximeter. In contrast, the incumbent technology provider emphasizes that these costs are not very high in comparison to the other costs one has if starting to be a taxi driver. This makes sense, given that the incumbent technology provider’s business is based on taxis using the technology the technology provider develops and sells. Overall, all the speakers seemingly were advocating their own interests in the discourses they produced or reproduced around the taximeter.
We also claim that the taximeter provides interesting opportunities to examine the entanglement of materiality and discourse (cf. Barad 2003, Orlikowski & Scott 2015): the starting point of our analysis, a material object of taximeter is shaped by, realizing as well as shaping various kinds of discourses produced or reproduced by the central stakeholder groups involved in this study. In addition to the taximeter, there are also other material objects as well as practices and human bodies shaped by, shaping and realizing these discourses, including the taxi cars, taxi drivers, their work practices, laws, policies, and mobile technology, to name a few. Those are being produced, made, and reconfigured within the process examined in this paper (cf. Barad 2003, Orlikowski & Scott 2015).

<table>
<thead>
<tr>
<th>Theme</th>
<th>Discourse (Stakeholder)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs</td>
<td>D9 (ITI); D11 (ITP); D16 (NE)</td>
<td>Discourses revolving around costs associated with the taximeter. The NE and the ITI argued that the costs associated with the taximeter have negative effects, whereas the ITP emphasized that the taximeter is not that expensive.</td>
</tr>
<tr>
<td>Legislation</td>
<td>D1 (L); D3 and D6 (LD); D12 (ITP)</td>
<td>Both the LI and ITP presented the taximeter as the “safe way to go” if one wanted to ensure compliance with the new legislation. The LI additionally emphasized that the taximeter is a means to have automatic accounting of the type of journeys (customer driving, private driving, etc.) in compliance with the law. The L in contrast addressed the aspect that the taximeter has been overregulated previously.</td>
</tr>
<tr>
<td>Taxation</td>
<td>D4 (LJ); D7 (ITI);</td>
<td>The LI and ITI argued that the taximeter ensures that taxi drivers pay their taxes.</td>
</tr>
<tr>
<td>Technology</td>
<td>D2 (L); D5 (LI); D10 (ITI); D13 (ITP); D14 and D15 (NE)</td>
<td>The LI emphasized that the taximeter is a reliable and valid technology, and the ITP specifically addresses the undestroyability of the memory in a taximeter. The ITI and NE, in contrast, presented the taximeter to be an outdated, obsolete technology.</td>
</tr>
<tr>
<td>Occupational identity</td>
<td>D6 (ITI)</td>
<td>The ITI emphasized that the taximeter plays a distinct role in the positive occupational identity of taxi drivers in Finland.</td>
</tr>
</tbody>
</table>

Table 2. Themes around which the discourses revolved.

5.2 Implications of the study

Our aim was to understand the consequences of ambiguity in technology policy. For IS research, this study offers a treatment of the theoretical concept of ambiguity by addressing its benefits and challenges. It also connects ambiguity to a neglected research area by IS research: governmental policy making. We were able to show through discourse lens how different stakeholders respond to the ambiguity in technology policy. The contribution of our study is twofold. First, we suggest that ambiguity gives rise to different discursive interpretations of technology, otherwise rather stable in the qualities of the material artefact. Taximeter gains its social existence through the meanings constructed around it: what purposes is it for? Ambiguity emerges from the difference between the current taximeter as an existing material artefact and the renewed technology policy as a rhetorical representation of the technology.

By balancing between accuracy and flexibility in policy decision making, legislators are producing ambiguity, intentionally or unintentionally. On one hand, goals of the policy are multifaceted which gives rise to multiple interpretations as highlighted by the differences the interviewees presented. On the other hand, ambiguity concerns the means: how the goals of the policy are to be implemented by the controlling body (legislation implementer) and realized in the actual taxi work practices. The differences are seen in the discourses and in whether the existing taximeter is seen in a positive or a negative light. In some occasions, ambiguity seems to serve stakeholders’ own purposes. For instance, new entrants promote a change in the existing practices by highlighting different goal-setting (measuring distance and time, serving the customer) at the cost of the more control-oriented goals (e.g., taxation).

Overall, a material-discursive struggle can be seen to emerge around this piece of technology and its surroundings. Competing discourses existed around the taximeter. Discourses were also negotiated and challenged (Weedon, 1987; Weedon, 2004). The people producing and reproducing discourses were competing of the power to define the meanings associated with the taximeter. The discourses were producing and advocating understandings of the world, of taximeters in this case, that were serving particular interests (cf. Foucault, 1972). Simultaneously, the discourses posit the speakers in distinct ways (cf. Foucault, 1972; Weedon, 1987): as advocates or opponents of taximeters, among other positions. Many of the interviewees occupant an influential position in the taxi industry. They have a capacity to
invest these discourses in practice (cf. (Foucault, 1972; Foucault, 1980)). Materiality can also be argued of being entangled with these discourses: the taximeter, the speakers and listeners with their human bodies and work practices as well as other kinds of objects and spaces were shaped by and shaping the discourses as well as realizing them (see also Barad 2003, Orlikowski & Scott 2015).

Second, thus far, ambiguity has not been addressed in IS policy research (Majchrzak and Markus, 2013; Majchrzak et al., 2016; Niederman et al., 2017). This study contributes to the IS policy research by showing the role of ambiguity in technology policy making and implementation: it may enable collaboration among divergent parties and open doors for new technologies but at the same time it can create confusion and conflicts (see e.g. Eisenberg 1984, (Eisenberg and Witten, 1987; Sonenshein, 2010; Liu et al., 2018). Ambiguity is exercised for example in the legislative drafting of directives of the European single market, under the banner of technology neutrality (Koops, 2006). The purpose of the principle of neutrality is to indiscriminate between different types of technologies. Giving up deliberately in specificity in regulation inevitably means the emergence of ambiguity, which results in different consequences at the level of policy implementation and realization. IS research sees policy often as normative specification of action and focuses on its implementation and adherence to it, or aims at influencing it. Yet, organization and strategy researchers have long acknowledged that ambiguity is the nature of all complex organizations (Weick, 2001). Ambiguity can be an equally good or perhaps better basis for policy. IS policy research should better acknowledge ambiguity and its possible consequences.

Our observations regarding the role of ambiguity in catalysing the discourses around taximeters hold practical implications for policy makers and implementers and IS researchers. As technology policy-making is surrounded by uncertainties due to the technological environment changing at a rapid pace and the principle of technology neutrality, ambiguity may allow room to adjust to changing circumstances. Ambiguity could be used as a discursive resource (Jarzabkowski et al., 2010) already in the planning phase, giving the legislators a better understanding of different views to the policy before ratification. Policy making could become more as an iterative process, resembling the cyclical patterns of strategy development and reorientation proposed by Abdallah and Langley (2014).

### 5.3 Conclusion

We have provided a rich analysis focusing on technology discourses following ambiguous policing of taximeters. Three central issues arise from our study: First, through policy ambiguity it is possible for different discursive interpretations of a technology to appear, which opens for a ‘stable material artefact’ a possibility to be something totally else. Second, our observations highlight limitations with the present notions of policy in IS research. The standard approach to address policy has been through including a “policy implications” section at the end of research articles. This implies that policy recommendations are evidence-based “best practices” that can be easily recontextualized. But as shown by Wagner et al. (2006), claims about “best practices” are dubious. Research should thus embrace the immanent ambiguity and acknowledge strong contextuality. Third, our case serves as a demonstration of the entanglement of materiality and discourse: the taximeter is a material object, but it is also tangled in various discourses. The materiality is not without the discourse and vice versa. An inherent complexity of technological and legislative transitions exists.

Our research has its limitations. First, our study focused in Finland only. Comparative studies between different countries could reveal more nuances of policy ambiguity concerning taximeter regulation. Second, our data collection ended in summer 2018. When we finished writing this paper in March 2019, the taximeter policy ambiguity and its conflicting interpretations were still open issues. We intend to follow up on the developments of this topic. We see policy-oriented research as an important way to how IS research can inform practice (e.g., Lanamäki et al., 2011; Chiasson et al., 2018). Future research could also study the taximeter discourses within broader transport policy and taxi/ridesharing regulation literatures (Beesley, 1973; Collier et al., 2018; Cetin and Deakin, 2019; Paik et al., 2019).
References


