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Flowcharts, Swimlanes, and Timelines – Alternatives to Prose in Communicating Legal-bureaucratic Instructions to Civil Servants

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Abstract

Government-published documents often fail to communicate clearly – with citizens, but also with “professional readers” like civil servants. Visual or multimodal approaches remain rare. In particular, this is an unhelpful practice in regards to legal-bureaucratic instructions (e.g. contracts, rules, policies), which exist to guide compliant behavior.

The study explores the development and the experimental evaluation of a diagrammatic guide for public procurement Terms & Conditions, addressed to civil servants. Results show that the diagrammatic format, in comparison to prose, significantly enhances comprehension accuracy and answering speed, and is perceived as more appealing and functional by the users.

1. Introduction

Even though the plain language movement greatly influenced several governments towards creating more accessible and usable information (cf. Piehl & Sommardahl, 2016), and has stressed the importance of visual design in clear communication (cf. Mazur, 2000), the great majority of government-published documents remains purely textual. It is indicative that even government-issued guides or directives on how to create clear public documents are set in long, unappealing, mostly textual formats – although those same guides recommend using graphics to further clarity and capture the readers’ attention (e.g. Australian Government Office of Parliamentary Counsel, 2013).

Unfortunately, these dense textual documents often do not meet their goal to inform and direct the behavior of either general public or “professional readers” – those who need these documents in order to carry out their jobs. For instance, research conducted in the UK on how to best present legislation to its users (Bertlin, 2014) reveals that even experienced lawyers can struggle in understanding it (p.47). Scholars have identified some recurrent problems in government-published documents: e.g. excessive document length due to years of amendments and additions (Waller, 2011, p.2); indifferntiated layouts and structures (Waller, 2011, p.2), often reminiscent of texts created with a typewriter (Schriver, 2015, p.177); and the use of bureaucratic language, which is distant and unfriendly (Schriver, 2015, p.177), highly technical (Waller, 2015, p.1), impersonal and complex (Jansen, 2001). Arguably, a lack of explanatory visuals elements and well-designed document layouts make legalese and bureaucratese even harder to process. Plain

language is necessary, but not sufficient, in engaging wary potential readers: visually disorganized documents and walls-of-text just *look and feel* difficult (Waller & Waller, 2015). When people do not easily perceive enough relevant information at a first glance, and thus anticipate high mental effort, they will simply not read (Fennema & Kleinmutz, 1995). Worryingly, and somehow counter-intuitively, this may be especially true for civil servants. Workplace readers are in fact extremely selective as what and whether to read, as reading is a goal subordinated to some other pressing work-related task (Wright, 2015). They can easily misunderstand or misapply information because of time-pressure, stress, fatigue, or a distracting reading environment (Jarrett et al, 2010). Overload is also an issue: Neutelings (2001) has estimated that Dutch parliamentarians are expected to read 250 000 pages a year. While public organizations may be more willing to invest in good design when addressing citizens (e.g. Waller & Waller, 2015; Waller, 2015; Schriver, 2015), they may be blind to the need for it in internal communication, and prefer to do things “the usual way” (Wright, 2015). Misunderstandings and poor decisions can arguably have negative consequences on the effectiveness, efficiency and credibility of public organizations, and affect the good functioning of civil society at large.

A purely textual format, presented or not in an effective layout, remains problematic when the goal of a document is to regulate behavior – as is the case with contracts, policies, regulations, bylaws, and guidelines. Although the very goal of these documents is to tell people what their responsibilities and duties are, they are presented as statements rather than as instructions: this easily leads to misunderstandings, as it requires readers to make their own inferences as to what is appropriate (Redish, 1989; Wright, 2015). According to Sless (2015) a legalistic mindset is to blame: a widespread assumption in government and regulatory bodies is that controlling words and neatly specifying content is sufficient to control behavior – while supporting actual user tasks through design is ignored.

Studies show that is best practice to integrate textual and visual elements in instructions (e.g. Jansen & Steehouder, 1984; Mayer & Gallini, 1990), rather than using words or pictures alone. In particular, diagrams are typical in effective instructions. Diagrams foster understanding by helping users identify the steps required to complete a procedure (Roy & Grice, 2004), the correct sequence of required actions (Jansen & Steehouder, 1996), and the functional components of a system (Roy & Grice, 2004). They are indispensable because they communicate more effectively than text relationships between elements (Ware, 2013, p. 304) – such as sequences, transitions, interactions.

However, diagrams are the great absentee in legal-bureaucratic instructional documents. Even research on government-published documents has ignored, with few exceptions (e.g. Jansen & Steehouder, 1984; Berman, 2000), the possibilities of diagrammatic representation and explanation, focusing instead on layouts and formats for fully textual genres (legislation: Waller, 2015; Rogers, 2015. Government letters: Renkema, 2001; Waller & Waller, 2015) or forms (e.g. Schriver, 2015; Jansen & Steehouder, 2001). A novel body of research on “contract visualization” – that is, the use in contract documents of diagrams, systems of icons, visually-structured layouts, comics and vignettes (e.g. Kay & Terry, 2010; Mamula & Hagel 2015; Haapio et al, 2016; Passera et al, 2016; Passera et al, forthcoming; Waller et al, 2016) – reported initial results on the possibilities of visual explanations in a legal-bureaucratic document genre. However, the field would benefit from more empirical evidence, more rigorously collected and analyzed.

Despite the potential benefits of diagrams in making legal-bureaucratic instructions clearer, governments may be reluctant to change their practices, given the lack sufficient field-specific, document-specific and audience-specific inspiring examples and research evidence. Knowledge

from technical communication research (e.g. how to clearly visualize objects, users' body parts, and physical actions) may look irrelevant in making contracts, policies and legislation any clearer. However, some of the key instructional principles from that domain can still be applied. For example, procedures can be presented from the perspective of the users, as simple, non-redundant steps (Boekelder & Steehouder, 1998; Michael & Hartley, 1991), mirroring their likely course of action (Schriver, 2015; Jansen & Steehouder, 1984).

Rigorous evaluation studies of diagrammatic legal-bureaucratic instructions in a real governmental setting may persuade public writers that the approach is possible and desirable. From a research perspective, the focus on diagrams complements previous research on government documents, which focused mostly on overall document design issues (e.g. layout; visual navigation and hierarchy; forms design). This article seeks to generate knowledge on such issues, guided by three research questions:

1. To what extent can diagrams help understanding legal-bureaucratic instructions, which are originally in written format?
2. What types of diagrams can be used for this purpose?
3. Is a diagrammatic approach effective with the intended primary audience(s) of legal-bureaucratic instructions?

In this study, I present the development and the experimental evaluation of an explanatory visual guide for the JYSE 2009 SERVICES – the standard Terms and Conditions¹ (T&C's) used in Finnish public procurement contracts for service purchase. The JYSE Visual Guide² consisted of a collection of 23 diagrams (swimlane tables, flowcharts, and timelines), one per page, each addressing a specific contractual topic. All texts, apart from an introductory section, a table of content, and the headings on each page, were incorporated within the diagrams. The Visual Guide and the original version of the T&C's included both the same information, but presented in different format: the former as diagrams, the latter in prose. The effectiveness of the Visual Guide was assessed through an experiment based on comprehension questions, carried out with procurement personnel from several public organizations.

The results of the study show that the diagrammatic format, in comparison to prose, significantly enhances comprehension accuracy and answering speed, and is perceived as more appealing and functional by the users. The experimental data is complemented with qualitative data from focus groups. The findings provide evidence that diagrams are more effective than prose in communicating a specific type of legal-bureaucratic instructions – contracts – and that the format is suitable to support the work and information needs of civil servants.

The remainder of the article is structured as follows. Firstly, I provide a theoretical background, which contextualizes the study and its results in relation to research on contracts, government

¹ Terms and conditions (T&C's) are a specific type of contractual document. Their role is to set out service specifications, as well as general and specific responsibilities, rights and duties of the parties. T&C's usually are a non-negotiable document, which can constitute the entirety of an agreement (e.g. in business-to-consumer settings, also called terms of service), or just a section of the whole agreement (e.g. in public procurement or business-to-business commercial contracts).

² The JYSE Visual Guide (*JYSEn Käyttämisosas – JYSE 2009 PALVELUT*) is available online at: <http://goo.gl/yGgmAf>

documents, and diagrams in instructions. Secondly, I describe the empirical context of the study, and the problems that were addressed. Then, in light of theory and context, I formulate three hypotheses, describe the methodology chosen to test them. Lastly, the results and their limitations are discussed. Reflecting on the case described in this study, I also offer suggestions on how to integrate visual design in the production process of public documents.

2. Theoretical background

Given the multidisciplinary nature of the study, I chose a convenience review of past literature around the following themes: 1) the use of visual language in legal documents, in particular under a proactive law lens; 2) the role of diagrams in instructions, and which diagrams may be suitable for legal-bureaucratic content; 3) the barriers in adopting more visual formats in governmental documents.

2.1. Contracts-as-instructions: the proactive law lens

Changing attitudes towards visual communication in law.

The legal field is traditionally a textual and verbal domain, and famously resistant to innovate on its conventions. Visual communication is a rather novel proposition, and its possibilities have not yet been sufficiently explored empirically and theoretically. However, legal scholars predict a greater use of visual elements in the future since lawyers and judges increasingly peruse legal documents on screen rather than on paper, and can more easily create and include multimedia elements in documents without significant costs (Porter, 2014; Johansen & Robbins, 2015). Apart from technology, the plain language movement is the other factor challenging the monopoly of text, as the goal is not writing per se, but communicating clearly. Plain language advocate and law professor Joseph Kimble lists “design” as one of the 5 key elements of plain language, and encourages to “use diagrams, tables, and charts as needed to help explain the text” (2002, p.44). The Federal Plain Language Guidelines in the US (Plain Language Action and Information Network, 2011) and the Plain English Manual of the Australian Office of Parliamentary Counsel (2013) share these recommendations; the latter manual, in particular, suggests the use of diagrams to plan, clarify and test the logical correctness of rules, and encourages writers to consider including such diagrams in the final bill (p.11). A report on new formats for Canadian legislation states that “using diagrams to help describe laws is revolutionary” and “likely the most innovative design feature” in the new, suggested format (Berman, 2000, p.23).

Legal scholars such as Murray (2015) welcome a greater use of visual communication in law as a way to help bridging cultural, language and literacy gaps between legal experts and clients, jurors, and decision-makers. Judge Posner (2013) and Chief Judge McKee (Johansen & Robbins, 2015) call for more lawyers to use visuals in legal briefs, and Rosman (2013) suggests at least 7 ways in which visual elements can improve their clarity and factuality (e.g. explaining a rule, showing a case procedural history, illustrating the relationships among the parties, etc). Of course, the issue of the legal interpretation and enforceability of visual language is an open one, but solutions have been proposed: for instance, recognizing that visuals (just like text) are rhetorical devices, courts could adopt rules for use and interpretation inspired by the ethical codes of photojournalists (Porter, 2014). Alternatively, one may clearly state on legal documents that, in case of inconsistencies between text and visual, the textual version prevails – a solution already commonly used in bilingual contracts.

Persuasion vs. functionality.

While legal research has mostly concentrated on visual legal rhetoric and the *persuasion* of materials used in court, such as briefs, judicial opinions, pieces of evidence, and jury instructions (Sherwin, 2011; Porter, 2014; Rosman, 2013; Miles & Cottle, 2000), a second stream instead addresses the *functionality* of legal documents in everyday use, *outside* of adversarial settings. The so-called *proactive law and contracting* scholars focus especially on improving business-to-business or business-to-government contractual documents and practices, so as to preventing disputes and securing business success for both parties (Haapio & Siedel, 2013, p.6). Proactive law opposes the narrow view that contracts matter only to lawyers, and – in case of disputes – to judges (Pohjonen & Koskelainen, 2012; Barton et al., 2013; Barton et al. 2015; Kim, 2013; Haapio, 2013b). Conversely, it calls for simpler, clearer, human-centered contracts, which should be understandable also by business managers and consumers. In this research stream, contracts (and other ‘governance’ documents, such as bylaws, policies, etc) are seen as instructions: *visible scripts for the parties to follow* (Berger-Walliser et al, 2011, p.57), *blueprints for [business] performance* (e.g., DiMatteo et al., 2012, p.92), *user’s guides* and *instruction manuals* (Mitchell, 2013, p.21), *information products* and *useful devices* that must meet the needs and expectations of all readers’ groups (Haapio, 2014, pp.453). Contracts are not only legally enforceable *rules*, archived until disagreements arise, but a managerial tool *to be used* to monitor the correct implementation of transactions and projects. The user- and goal-dependent focus in this stream resonates with the priorities of plain language, technical writing, and information design – supporting document users to understand and achieve their goals quickly, with no mistakes.

A methodological research gap.

Proactive law research addressed layout, diagrams, and other instances of visual language in contractual documents from two perspectives. The majority of these studies argues for visuals in contracts from a theoretical perspective (e.g. Barton et al, 2013; Berger-Walliser et al, 2011; Haapio, 2013a). While it often shows examples and redesigns, it does not offer an empirical quantification of the benefits of visual alternatives to prose. Few studies sought to evaluate experimentally readers’ comprehension and while their results seem encouraging, their validity is affected by methodological limitations: in one study, only a small part of the contract included diagrams and was tested (Mamula & Hagel, 2015); in another, the participants were university students, and the visual version of the contract used in the experiment was a mock-up created just for the study (Passera, 2015); in another study, explanatory diagrams were used, but the sample of participants was very small, and the statistical analysis is not thorough (Passera, 2012); in yet another, the main finding is that visual elements increase the time spent reading software license agreements – but increased comprehension of the agreement seems to be just a direct function of increased reading time (Kay & Terry, 2010). An additional issue is that the terms ‘visualization’ and ‘design’ are used to refer to quite different expressions of visual language: layout and overall document design (Waller et al, 2016), layout and icons (Passera, 2015), explanatory diagrams (Passera, 2012), illustrations and vignettes (Kay & Terry, 2010), and multimodal genres such as comics (Haapio et al, 2016).

Acknowledging these issues, the current study seeks to confirm these initial explorations through a more rigorous and convincing methodology. Moreover, building on the conceptualization of *contracts as instructions*, I decided to focus specifically on the explanatory possibilities of diagrams.

2.2. Diagrams as comprehension aids in instructions

The effectiveness of visual means in conveying complex information have been reported in many research areas, i.e. information visualization (e.g. Ware, 2013), human-computer interaction (e.g. Blackwell, 2001), educational psychology (e.g. Chandler & Sweller, 1991), technical communication (e.g. Fukuoka et al, 1999), and, more recently, managerial studies (e.g. Platts & Tan, 2004; Kernbach et al, 2015). Consistently with the focus of this article, I will concentrate on literature about diagrams and their role in comprehending instructions.

Instructional diagrams.

In regards to instructions – intended as documents seeking to give directions on how to accomplish a procedure, solve a problem, or behave – literature on the role of visual language can be roughly categorized as follows: a first stream considers the overall document design level, examining how visual elements in layouts are used to rhetorically and perceptually affect text reading and understanding (e.g. Tenbrink and Maas, 2015; Ganier, 2004; but also, more in general, Waller, 1980; Kostelnick, 1990, 1996). The second stream focuses on the role of diagrams, illustrations, photos, screenshots and symbols in supporting learning, inference and understanding – mostly in domains such as procedural, operational and assembly instructions (e.g. Fukuoka et al, 1999; Krull et al, 2004; Maes & Lenting, 1999; Roy & Grice, 2004; Rude, 1988), or mathematical and scientific problem-solving (e.g. Lambiotte & Dansereau, 1992; Larkin & Simon, 1987; Mayer & Gallini, 1990).

The latter stream shows that diagrams often outperform linear text in supporting attention and information search (Larkin & Simon 1987; Wright & Reid 1973); deductive reasoning (Bauer & Johnson-Laird 1993); comprehension and problem solving (Glenberg & Langston, 1992; Masri et al, 2008; Mayer & Gallini, 1990; Mayer et al, 1996; Wright & Reid 1973); and recall (Glenberg & Langston, 1992; Mayer & Gallini, 1990; Mayer et al, 1996). These effects occur because diagrams decrease cognitive demands by working as external memories (Bauer & Johnson-Laird 1993). By mapping logical relationships into visible spatial relationships, the cost of interpretation is offloaded to the external representation – which can simply be “read-off” (Scaife & Rogers, 1996). Making relationships visible constrain possible interpretations and guide correct inferences (Stenning & Oberlander 1995). Cognitive load theory (Chandler & Sweller, 1991; Sweller, 1994) posits that different ways to present information impose different loads on human working memory. Since humans possess different processing systems for visual and verbal information (e.g. Baddeley, 2003; Paivio, 1979), and each working memory sub-system has a limited capacity (e.g. Sweller, 1994; Baddeley, 2003), solutions that integrate verbal and visual elements are easier to process. Diagrams, merging visual and textual elements in a holistic display, rely on the relative strengths of different modalities: visual elements are usually better at representing relationships, mechanisms, parts’ functions, trends, and patterns (Albers 2012, p., 269; Mayer & Gallini, 1990), but text is usually better at conveying abstract concepts, and denoting terms, details and meanings precisely (Doumont, 2002; Albers, 2012, p.269).

These findings should be considered in the presentation of complex instructions, where information overload and mistakes prevent readers are required to act upon information in the correct way.

Flowcharts, tables, timelines.

Providing information from the perspective of the users results in instructional effectiveness (Schrivier 2015). Applying this principle means, for instance, to present instructions in a step-by-step fashion that facilitates the process of “mental animation” of the procedure (Roy & Grice,

2004); to accommodate for the use of instructions in the situation and moment in which they are needed (Boekelder & Steehouder, 1998); and to arrange the content in both chronological and modular order, so as to support different reading and searching styles arising from users' goals (Ganier, 2004).

Readers tasked with implementing *contracts as instructions* would benefit from a specific perspective³. For example, they need to understand if a certain rule applies to them; who is responsible to do what; what actions are required; deadlines; and how to remedy to problems. With this in mind, some types of diagrams seem particularly fit for the purpose.

Flowcharts offer a suitable alternative to prose when users need to consider complex combinations of contingencies to solve a problem (Wright & Reid, 1973); distinguish between relevant and irrelevant information for their situation (Michael & Hartley, 1991); reduce complex problems or procedures in a sequence of simpler steps (Holland & Rose, 1981); and switch between reading and taking action at the right moment (Boekelder & Steehouder, 1983). Some authors (e.g. Wright & Reid, 1973; Holland & Rose, 1981; Jansen & Steehouder, 1984) have indicated legalistic, bureaucratic texts as the typical example of information better expressed through flowcharts, as they are characterized by complex conditional structures (signaled by terms such as *if/then*, *unless*, *notwithstanding*, etc). Business law scholars have proposed flowcharts as effective methods to map and communicate clearly business transactions and procedures (Jones & Oswald, 2001; Conboy, 2014), albeit no empirical evaluation was conducted.

Tables are also a valid alternative to prose, although often yield more comprehension mistakes than flowcharts (Wright & Reid, 1983; Boekelder & Steehouder, 1998). Thus, they are recommendable for comparatively simpler problems, and when speed matters more than decision accuracy (Wright & Reid, 1983). Tables create a visible structure helpful to select and sort information (Rude, 1988). Strylowski (2013) invited legal writers to use tables to clarify their thoughts, and express them concisely.

Given the importance of presenting instructions in chronological order (Jansen & Steehouder, 1996), there is surprisingly little research on timelines, “*graphical representations of a set of temporal units punctuated by ‘tasks’, ‘events’ or ‘milestones’*” (Yakura, 2002, p.956). One may distinguish between time charts – which focus on the duration of events – and process diagrams – which stress instead the order and temporal relationships between events (Lohse et al, 1994). Gantt charts, timelines and other representations of time are ubiquitous in organizations, as they support coordinated action (Yakura, 2002). Timelines have also been suggested as a solution to disambiguate contractual issues related to contract duration and termination (Mamula & Hagel, 2015; Passera & Haapio, 2011b).

2.3. Diagrams and explanatory visualizations in government documents: barriers to adoption

The previous sub-section provided a short review on diagrams as an effective instructional method, and also identified some techniques that may be effective in contracts and other legal-

³ The distinction among different contract readers is crucial. Lawyers and judges usually do not need to implement contracts. Their goal is to assess them and, eventually, find what is wrong with them. Thus, they read *everything* in a contract, multiple times, and with intent (Burnham, 2003). The current problem is that *other audiences* are not taken into account when contracts are drafted, resulting in formats that are dysfunctional and unfit for business and administrative readers (Haapio, 2013a).

bureaucratic instructional documents. Why then governmental organizations are still not taking advantage of diagrams in instruction-like documents? Why the few inspiring examples can mostly be found in pilots and research studies, but have not been taken into use?

The reasons are complex, spanning from the existing mindset to document production processes in public organizations. Jansen (2001) suggests that *'public writers do not consider themselves to be writers, but rather policy designers or legislators...And a "good policy" is not synonymous to an excellent written policy paper'* (p.120). Public writers judge document quality by their own criteria: official texts must seem to *'follow naturally from objective circumstances'* (Jansen, 2001, p.127), and *vagueness* is a strategy to preserve the imperative tone of the documents when unpleasant details need to be presented to the audience (p. 128). Waller (2012, min. 10:04) talks instead about *'design illiteracy on the part of the writer'*, defining it as *a lack of models and grammar to obey when composing documents, a lack of understanding of affordance and gestalt, and a lack of empathy with the user*. He also doubts that the average public servant has access to suitable design tools, or sufficient skills to use them effectively (Waller, personal communication, 11 December 2015). Experimentation with visual formats may be further hindered when authoritative supporters of simplification and plain language in the legal field do not recognize the functional role of visual language, dismissing it as embellishing 'bling' (Adams, 2011). Lastly, doubts on how to manage the time and costs of design may further reinforce the status of visual communication as an optional, rather than a necessity.

These attitudes and practices lead to well-documented shortcomings in government-to-citizen communication (see e.g. Janssen & Neutelings, 2010; Waller & Waller, 2015; Schriver, 2015; Holland & Rose, 1981; Jansen & Steehouder, 1984). However, impersonal and dense documents create confusion and inefficiency also *within* public organizations, especially when they should constitute actionable instructions to guide the work of civil servants and decision-makers.

While a single study can in no way represent best practice, the case presented below illustrates that a different approach to effective legal-bureaucratic instructions in a governmental setting is indeed possible. Diagrams can accommodate both the need for the precise language of legal experts and the comprehension needs of readers. Also, their production is not necessarily too resource-intensive if government writers flexibly collaborate with designers.

3. Empirical background: A Visual Guide for the Finnish terms of public procurement

3.1. The problem

In 2007, the Finnish Ministry of Finance established a working group to produce standard Terms and Conditions (T&C's), designed to apply as broadly as possible to different types of public procurement. One such document, the JYSE 2009 SERVICES, was designed for the procurement of services (Ministry of Finance, Finland, 2009). The standard recommendation of the Ministry was to entirely incorporate the JYSE T&C's into public procurement contracts – which are formed, all in all, by four parts: the standard JYSE T&C's, case-specific contractual terms, the buyer's procurement announcement, and the seller's proposal. However, the Ministry also allowed the parties to agree separately on specific terms to better fit the procurement situation at hand. In order to make an informed choice whether to fully incorporate JYSE in public procurement contracts, civil servants must understand well these T&C's.

Between 2011–2013, researchers from a Finnish university collaborated with the Association of Finnish Local and Regional Authorities (*Kuntaliitto*) in a project aimed at studying and improving public procurement practices in Finland. During this project it transpired that often the meaning and influence of the JYSE terms was not fully understood. These issues incidentally emerged⁴ from the interviews and observations of 22 experts and civil servants, working at a medium-sized Finnish municipality. Discussions and meetings with experts from *Kuntaliitto* helped confirm the problem. Misinterpretation of JYSE terms had been a cause of ineffective procurement: mismatched expectations between suppliers and public procurers had resulted in defective service provision, claims, monetary loss, and, above all, citizens unhappy with public services.

The issues were summarized as follows. Firstly, civil servants often worked based on their memories and common sense, as they felt already overloaded with paperwork. According to the *Kuntaliitto* experts, even when the JYSE terms were actually read, many misunderstandings occurred. JYSE is not a particularly complex document, albeit its tone is neutral and official. The situation mirrored the findings of Jansen and Steehouder (2001): often it is a lack of understanding of the logic and goals of regulations – rather than terminology – that prevents understanding. In fact, sometimes civil servants mistakenly believed that JYSE was a complete, ready-to-use contract, instead of just a part of the contract. Another common misconception was that JYSE *must* be always fully incorporated in the public procurement contract. Consequently, the procurement units often missed the possibility to better customize their contracts and build better relationships with suppliers.

In many cases, misunderstandings could have been avoided with the help of a lawyer. However, most Finnish municipalities are small and do not employ a lawyer. They can only rely on the legal experts of regional procurement centres. In this situation, lawyers get involved too late, or are not consulted at all.

3.2. Towards a solution

In order to tackle these problems, in 2012 *Kuntaliitto* asked the researchers to propose solutions outside the box of a legalistic mindset. When the idea to develop an explanatory, user-friendly guide to the JYSE terms emerged, I was asked to join the case as a researcher and designer. *Kuntaliitto* wanted a guide for the JYSE 2009 SERVICES terms in particular, as misunderstandings and contentious situations were more frequent when procuring services, rather than goods. The explicit aims of the project were to present the JYSE 2009 SERVICES terms in a way that (L. Hoppu-Maenpää, personal communication, 20 October, 2011):

- 1) The document would feel appealing, simple, useful; it would also encourage reading by looking as little legalistic as possible;
- 2) Information would be more logically presented, and conceptual links between provisions more easily findable and understandable;
- 3) The most common sources of misunderstanding would be disambiguated, and the topics made more explicit through diagrams, in order to facilitate rapid and accurate comprehension.

⁴ The primary goal of the studies was to investigate organizational learning and co-creation in procurement networks (Klemelä et al, 2011).

Kuntaliitto had the power to publish an explanatory guide, while they did not have the power to modify the official JYSE 2009 SERVICES terms, as their publication was under the responsibility of the Ministry of Finance. Involving the Ministry and persuade them to initiate a redesign and redrafting project would have taken considerable time and effort, so *Kuntaliitto* opted for a solution – the Visual Guide – that could be developed and distributed to civil servants and vendors in a more reasonable timescale.

Although the Visual Guide could provide correct and thorough information (targeting, for instance, those who would *never* read the official JYSE), it had to be presented as a comprehension complement, rather than as a substitute of the original T&C's. To avoid any doubt in case of a dispute, the original JYSE 2009 SERVICES published by the Ministry of Finance had to remain the only official and legally valid version. The Visual Guide carried a clear disclaimer notifying readers of its non-binding legal status.

3.3. Design features of the Visual Guide

The original JYSE 2009 SERVICES consisted of a traditional, 20-page, textual document (Figure 1). The JYSE Visual Guide instead featured one diagram per page (swimlane table, flowchart, or timeline), each explaining a specific contractual topic at a time (Figure 2) – for a total of 28 pages. All texts (apart from the table of content and a short, one-page introduction explaining the approach of the Visual Guide) were integrated within diagrams, or were headings. The diagrams provided visual structures to collect and present together, on the same page, all thematically related clauses. Often, in the original JYSE document, such clauses were found in different sections, on different pages. Icons were also used next to the text chunks, to further cue their theme. The new approach aimed at helping readers in finding and integrating all the relevant information more easily – without the need to skim and browse through the whole document.

Three types of diagram were used, each for a specific type of information:

- 1) swimlane tables were used to list vis-a-vis the roles, rights and responsibilities of buyer and supplier (Figure 3);
- 2) flowcharts were employed to illustrate possible courses of action and their consequences, such as price changes, or explaining what happens in case of delays and defects (Figure 4);
- 3) timelines illustrated different possible scenarios leading to the end of the contract, either as agreed or due to termination or cancellation (Figure 5).

While *Kuntaliitto* approved this heavily visual approach, they set limitations on the language to be used in the Visual Guide. They insisted to use sentences and terminology from the original JYSE document. However they agreed to chunk down the original texts, adding more full stops and bullet points, so that the chunks could fit in the boxes and columns of the various diagrams. Every portion of text in the diagrams had to be identified with a clause number referencing to official JYSE (Figures 3–5).

personnel used in providing the service. The service provider shall retain work management and supervision responsibility for its own personnel, if no personnel hire or transfer of work management and supervision responsibility has been separately agreed.

8.5 If between the contracting parties there takes place a transfer of business in which personnel in the customer's employment transfer to the service provider's employment or the invitation to tender requires that personnel transfer to the service provider's employment on their former terms of employment, statutory provisions on the transfer of business shall be applied to the transferring personnel.

9 Customer's obligation to cooperate

9.1 The customer shall be responsible for ensuring that the tasks within the customer's responsibility are performed in accordance with the contract.

9.2 The customer must give the service provider sufficient and correct information for the provision of the service.

9.3 The customer must ensure that the service provider's personnel can access when necessary the customer's premises or equipment as agreed.

10 Price

10.1 The price shall be fixed, if not otherwise agreed. The price shall not include value-added tax.

10.2 The service provider shall invoice in accordance with the prevailing Value-Added Tax Act.

10.3 If not otherwise agreed, the price shall include the service in accordance with the contract, any indirect taxes and fees, excluding value-added tax, payable by the service provider and applicable at the deadline for tenders, travel and accommodation costs, daily allowances, overtime compensation and documentation relating to the service.

10.4 If not otherwise agreed, the service provider shall not be entitled to levy invoicing charges.

10.5 Any advance payment shall be considered a fixed part of the contract price.

10.6 The service provider shall have the right to take into consideration in the price reasonable direct costs arising from new public fees decreed by the authorities or increases of existing fees that take place after the submission of the tender, provided that they

were not known about when making the tender and that the service provider can demonstrate grounds for the price change. Accordingly the price of the service shall change from the date when the above-mentioned changes come into force. The service provider shall also have the above-mentioned right when the price is fixed.

10.7 If the price is not fixed, the service provider shall have the right during the contract period to adjust the price corresponding to the general cost trend of the supplies. The service provider must deliver a price adjustment notification in writing at least two (2) months before the price adjustment comes into force. The service provider must present to the customer an appropriate explanation of the cost trend and the reasons for the price adjustment. If no unanimity is reached on the price adjustment, the customer shall have the right to give notice of terminating the contract from the time that the price adjustment comes into force. The giving of notice must be made in writing before the new prices come into force. If the customer does not give notice of terminating the contract, the contract shall continue using the new prices notified by the service provider or other prices agreed together by the contracting partners in price adjustment negotiations.

10.8 If the price is not fixed, the customer shall have the right during the contract period to propose a price adjustment corresponding to the general cost trend of the supplies. If no unanimity is reached on the price adjustment and the customer considers that it cannot continue the contract under the prevailing prices, the customer shall have the right to terminate the contract with a notice period of two (2) months. Notice of termination must be made in writing. If the customer does not give notice of terminating the contract, the contract shall continue using the prices prevailing before the price adjustment proposal or using other prices agreed together by the contracting partners in price adjustment negotiations after the price adjustment proposal.

10.9 If not otherwise agreed, the contracting parties may propose price adjustments in the ways described in Paragraphs 10.7 and 10.8 at the earliest twelve (12) months after the contract came into force and at intervals of not less than twelve (12) months.

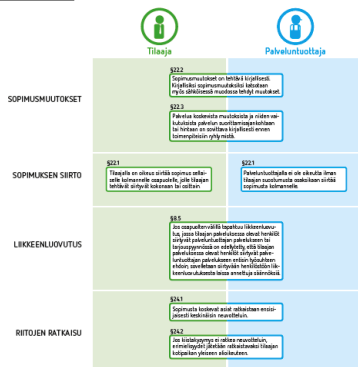
10.10 In the event of the customer giving notice of terminating the contract on the grounds presented in this section, the service provider shall be obliged if the customer so wishes to deliver the supplies at the prevailing prices, if the notice of termination has been made on the basis of Paragraph 10.8, or according to the prices notified by the service provider in the price adjustment notification, if the notice of termination has been made on the basis of Paragraph 10.7, until the time notified by the customer, however at most six (6) months from the ending of the contract.

11 Terms of payment

11.1 Payments shall be paid against an invoice. If not otherwise agreed, the invoice shall be due for payment twenty-one (21) days from the arrival of an acceptable invoice.

FIGURE 1: Example spread of the JYSE 2009 SERVICES terms (English version of the document). © 2009 Ministry of Finance, Finland. Used with permission.

MUUTOKSEN HALLINTA



KIINTEÄ HINTA JA HINNANMUUTOS

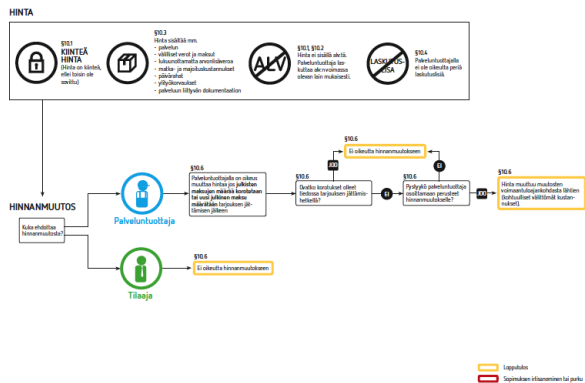


FIGURE 2: Example spread of the JYSE Visual Guide (Finnish version of the document). © 2013 Aalto University & Kuntaliitto ry. Licensed under CC-BY-ND 3.0.

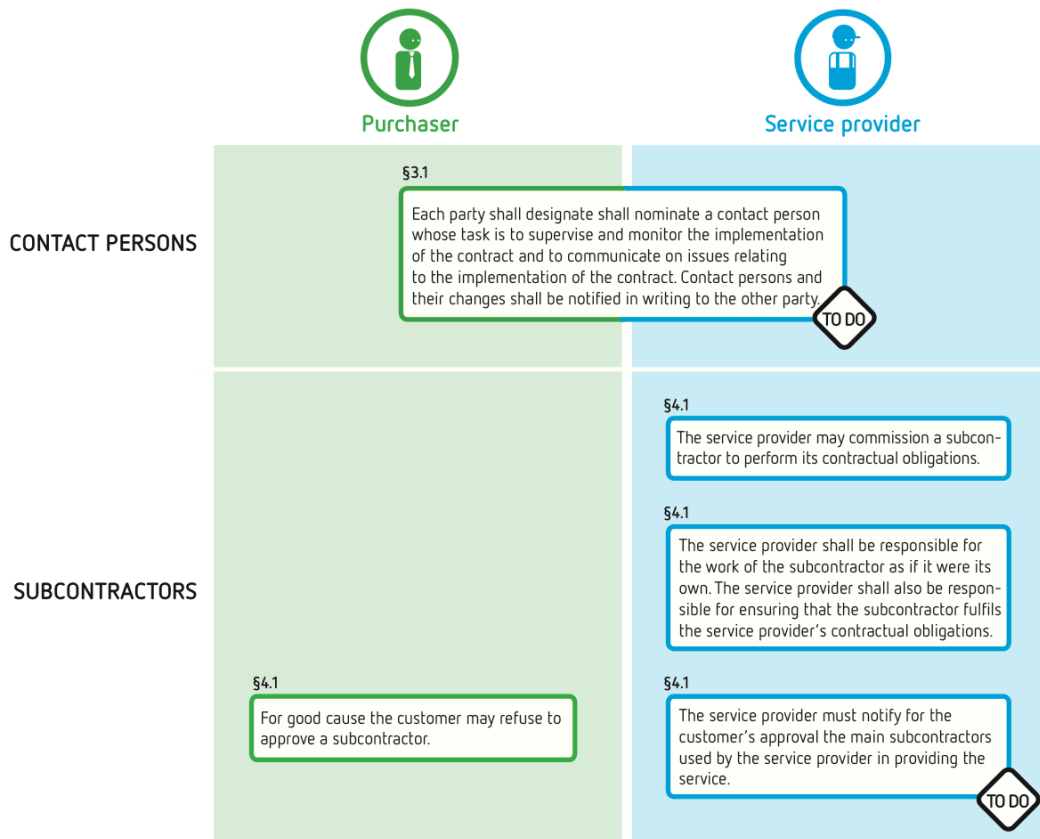


FIGURE 3: Example of Supplier/Purchaser swim-lane table, indicating the parties' responsibilities vis-à-vis (translation from Finnish). © 2013 Aalto University & Kuntaliitto ry. Licensed under CC-BY-ND 3.0.

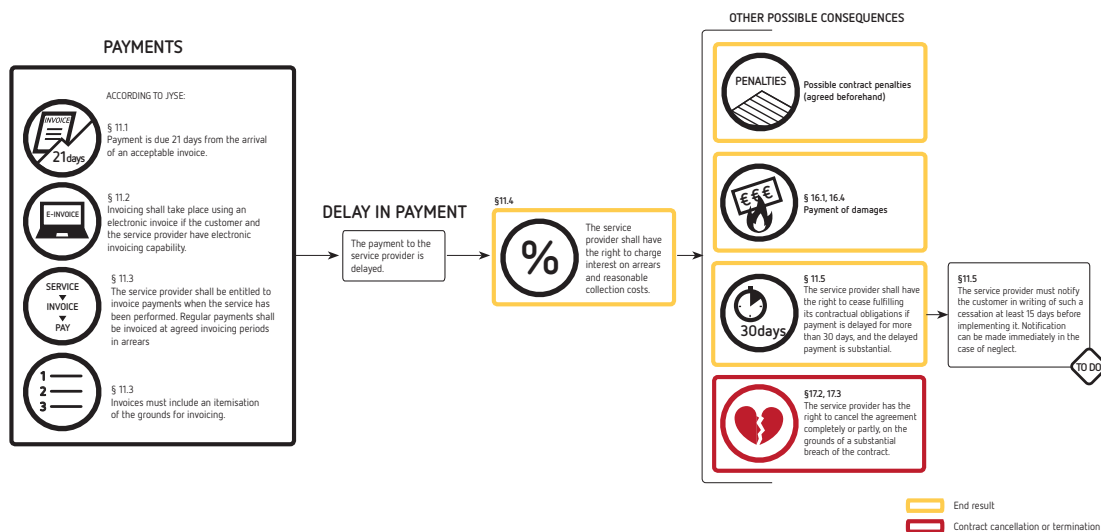


FIGURE 4: Example of flowchart, illustrating payment procedures and consequences arising from delayed payments (translation from Finnish). © 2013 Aalto University & Kuntaliitto ry. Licensed under CC-BY-ND 3.0.

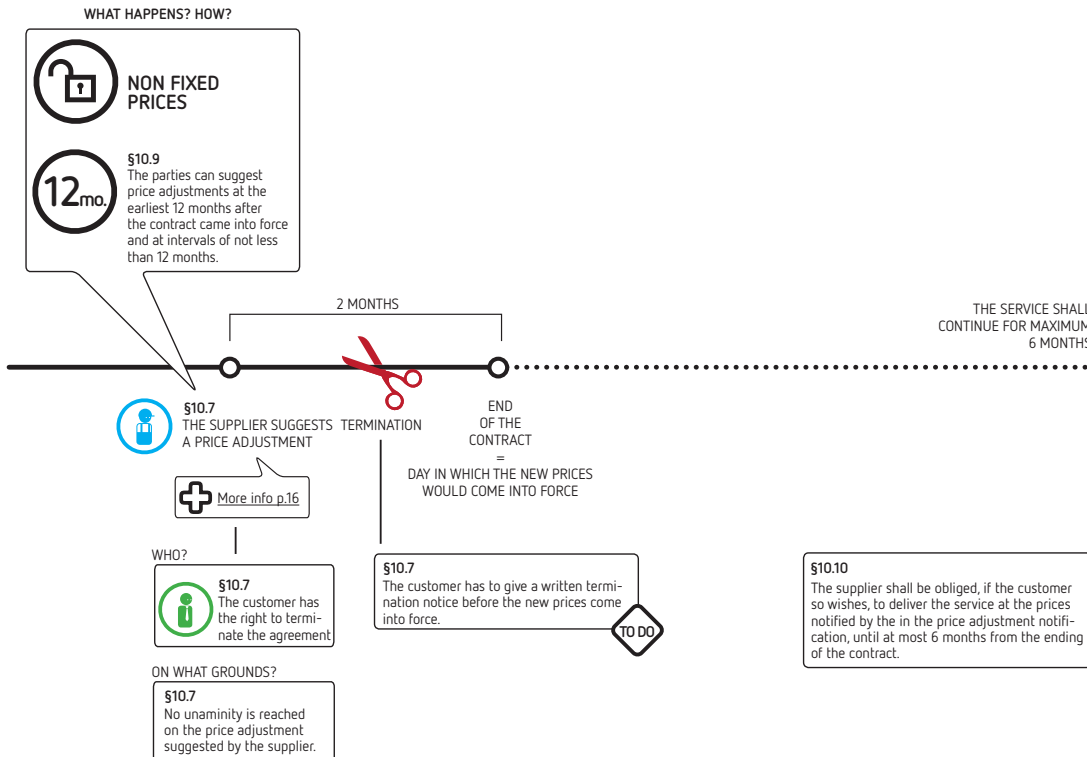


FIGURE 5: Example of timeline, illustrating contract termination if the Parties cannot agree on price adjustments, as suggested by the supplier (translation from Finnish). © 2013 Aalto University & Kuntaliitto ry. Licensed under CC-BY-ND 3.0.

3.4. The document design process

The JYSE Visual Guide was developed in collaboration with *Kuntaliitto*'s legal experts, who had a privileged perspective on the most common problems of JYSE. They could easily empathize with the target group, since part of their job was to train, support and advise local civil servants. This collaborative approach ensured that all design and language choices were approved step-by-step by those responsible for releasing the Visual Guide. The experts were asked to comment and suggest improvements as soon as a sketch was ready, since they had to ensure that the Guide included exactly the same content of the official JYSE. They also participated to several full-day workshops with the researchers, collaboratively sketching alternative versions of diagrams and icons icons, and experimenting with different wordings and document structures.

Kuntaliitto initially gave permission to get feedback only from a selected group of 5 civil servants, as they feared that without enough control an unfinished mock-up could mistakenly circulate and be used in the field before an official approval. For the same reason, the developing team could not involve representatives of vendors. Approved "proxies" of vendors were however allowed to participate in later feedback sessions: 2 public procurement experts at a private law firm, and 2 representatives of an association defending the interests of small-medium enterprises. The developing team alternated user and expert feedback in order to cycle through as many design iterations as possible.

When a complete mock-up document was approved, 24 civil servants from 9 public organizations were invited to test its effectiveness through an experimental evaluation, questionnaires, and by participating to a focus group discussion. In light of the findings, ambiguity in wording, diagrams, representation and layout were further reduced, and user preferences on colors and icons were taken into consideration.

The final design of the JYSE Visual Guide was published in the summer of 2013 on the website of *Kuntaliitto*, and its experimental evaluation is presented in the remainder of the article⁵.

4. Methodology

4.1. Hypotheses

In order to answer my research questions – and to evaluate the JYSE Visual Guide according to criteria agreed with *Kuntaliitto* (compared to the original JYSE, the Visual Guide should increase comprehension accuracy and speed, and feel more appealing to use) – three hypotheses were formulated:

H1: A diagrammatic format of legal-bureaucratic instructions (in this case, JYSE Visual Guide) allows for faster comprehension of their content, in comparison to the text-only version of the same document (in this case, JYSE 2009 SERVICES).

H2: A diagrammatic format of legal-bureaucratic instructions (in this case, JYSE Visual Guide) allows for more accurate comprehension of their content, in comparison to the text-only version of the same document (in this case, JYSE 2009 SERVICES).

H3: A diagrammatic format of legal-bureaucratic instructions (in this case, JYSE Visual Guide) elicits a more positive overall user experience, in comparison to the text-only version of the same document (in this case, JYSE 2009 SERVICES).

4.2. Experiment Design

The study took place between August 2013 and April 2014, and was carried out in 16 sessions because of the difficulty to recruit participants from several public organizations, in different cities, and adjust to their work schedules. Each session lasted between 90 and 120 minutes, and included an experiment based on comprehension tasks, self-administered questionnaires, and a focus group.

The experiment consisted of ten comprehension tasks, five to be answered using the JYSE Visual Guide (*Visual Condition*) and five using the original JYSE 2009 SERVICES (*Textual Condition*). The order of the comprehension tasks, as well as the experimental condition associated with the tasks, was randomized to avoid the so-called order effect (Cozby, 2009) – systematic bias in the score of later tasks, because repetitions of similar tasks caused learning or fatigue. Consequently,

⁵ Compared to the pilot study – the goal of which was to quickly inform decision-makers – the study presented in this article is more carefully designed: it employs a different, wider and more varied participant sample; it includes control variables in the statistical analysis; and it contextualizes the results in relation to previous research.

there were four different experimental possibilities (Table 1). Tasks 1-5 and Tasks 6-10 included questions of similar difficulty and format, and were piloted in advance with 3 research assistants to check that all questions were comparably challenging and clearly phrased.

The experiment was complemented with self-administered questionnaires before and after the tasks, as well as a focus group discussion at the end of the session, in order to gain further qualitative insight into the participants' impressions.

TABLE 1: Randomization of task completion and condition order across experimental subjects.

| Group 1 | Group 2 |
|---|---|
| Completes tasks 1-5 in Visual Condition First. Completes tasks 6-10 in Textual Condition next. | Completes tasks 6-10 in Visual Condition First. Completes tasks 1-5 in Textual Condition next. |
| Group 3 | Group 4 |
| Completes tasks 1-5 in Textual Condition First. Completes tasks 6-10 in Visual Condition next. | Completes tasks 6-10 in Textual Condition First. Completes tasks 1-5 in Visual Condition next. |

4.3. Documents used in the two experimental conditions

The experiment employed the original JYSE 2009 SERVICES documents in the control condition, and the JYSE Visual Guide in the experimental condition (see document descriptions in sub-section "Design features of the Visual Guide" above).

It is worth stressing that language, phrases and terminology in both documents were the same. This provided good experimental control and avoided introducing confounding variables related to language. As verified by *Kuntaliitto*'s legal experts, the Visual Guide is informationally equivalent to the official JYSE terms.

4.3. Research Participants

The participants were recruited from public organizations. The participants had to be actively involved in procurement in their organization. After sending invitations to over 80 public organizations, 76 volunteers agreed to participate in the study. 72 responses were valid and were included in the analysis.

The recruited research participants represented 12 Finnish municipalities, 9 universities and research institutes, 4 hospital districts and 6 other public organizations. The average age of the sample was 40.8 (SD = 10.74), and 68 % was female. In average, the participants had 6.9 years of experience in public procurement, and their self-reported level of knowledge of the JYSE terms was, in average, 5.3 on a 9-point scale where 1 means "very poor knowledge" and 9 means "excellent knowledge"). Most of them were well-educated, as they had obtained at least a bachelor (34,7%) or master degree (47,2%).

Unfortunately, vendor representatives could not be included in the study. Most public organizations with were unable to share contact information of their suppliers, because of privacy policies. A second attempt to recruit vendors consisted in asking professional associations and forums related to procurements to distribute an invitation through their online channels. However, not enough replies were received, and they came too late to be included in the study.

The research participants of this study are thus a convenience sample, and represent only the buy-side of the JYSE user base.

4.4. Measures

Comprehension Accuracy.

Since each condition comprised 5 tasks, each subject obtained two accuracy scores – one for the visual condition and one for the textual condition – each ranging between 0 and 5 and representing the sum of correct answers. Correct answers were assigned one point each, and partially correct answers obtained 0.25, 0.5 or 0.75 points (Table 2). All answers were graded, separately, by two researchers, who ended up agreeing on 99% of the grades. Discrepancies were discussed, and a final grade would be agreed upon together.

TABLE 2: Protocol for grading the response accuracy.

| Points | Rationale |
|--------|--|
| 0.25 | The participant only mention the clause number where the correct answer can be found, or writes down verbatim the relevant excerpt. However, s/he does not provide a correct, precise and clear response in own words (e.g. if answering correctly would require to provide a precise date, the date is not given) |
| 0.5 | The participant wrote down the relevant clause or rule in own words. However, s/he does not provide a correct, precise and clear response (e.g. if answering correctly would require to provide a precise date, the date is not given) |
| 0.75 | The participant provided a correct, precise and clear response in own words, eventually referencing the clause or rule s/he applied. However, there are minor imprecisions (e.g. if the correct answer would be a precise date, such as '4th of March 2016', the participant wrote instead '5th of March 2016') |
| 1 | The answer is correct in all respects. The participant provided a correct, precise and clear response in own words, eventually referencing the clause or rule s/he applied. |

Answering Speed.

Similarly, each subject's answering speed was measured on comprehension tasks in each experimental condition. Answering speed represents the sum of the time taken to complete all tasks in one condition.

User experience.

Two instruments were chosen to assess user experience (UX), the subjective feeling perceived by a user when using a given system (Preece et al., 2002). Both questionnaires were administered after the completion of each experimental condition. The first instrument, the HED/UT scale (Spangenberg et al, 1997; Voss et al, 2003), captures user perceptions of utilitarian and hedonic value in interacting with a design. The hedonic dimension (HED) represents the degree of gratification experienced by the users interacting with each document; the utilitarian dimension (UT) represents the perceived degree of functionality and usefulness of the documents. This

instrument was chosen because perceptions of functionality and pleasantness seemed well-suited to evaluate contracts: while pleasantness is important to engage potential contract readers, it is also crucial that the document is functional and useful. Each component of the HED/UT is measured on a scale ranging between 1 and 7 points, with 4 being the sufficiency threshold.

The second instrument, the I-PANAS-SF scale (Thompson, 2007), instead provides a measure of affective response. I-PANAS-SF is a shortened and validated version of the widely used Positive and Negative Affect Schedule (PANAS) (Watson & Clark, 1994), and it is suitable for use with non-native English speakers (Thompson, 2007). The questionnaire comprises 10 items in the format of a 5-point Likert scale. 5 items measure positive affect (PA: alert, inspired, determined, attentive, active), and 5 negative affect (NA: upset, hostile, ashamed, nervous, afraid). Positive and negative emotions are considered separately, as different emotions, in different degrees, may coexist in human experiences. Each component of the I-PANAS-SF is measured on a scale ranging between 5 and 25 points.

Control variables.

Control variables were employed to assess whether there were alternative explanations for score variations. They were also used to check for possible interactions between individual characteristics and experimental conditions. Before the comprehension tasks, each participant filled in a questionnaire providing details about 1) age, 2) gender, 3) years of experience in procurement, 4) self-assessed level of knowledge of the JYSE 2009 SERVICE document (on a Likert-type scale where 1 meant “very poorly” and 9 meant “extremely well”), 5a) object-imagery skill, 5b) spatial-imagery skill, 5c) verbal skill. The three last items address cognitive style, representing the preference of each individual for visual or verbal strategies of information processing. I used the Object-Spatial Imagery and Verbal Questionnaire (OSIVQ) developed by Kozhenikov and Blazhenkova (2009), a well validated self-report instrument composed of 45 items in the format of a 5-point Likert scale, which provides a measure of verbal skills, object-imagery skills (ability in building and processing vivid, colorful, detailed images of individual objects) and spatial-imagery skills (ability in representing and processing schematic images, and spatial relationships, movements and transformations).

5. Results

The first step of the analysis was to check the effectiveness of the randomization in limiting any systematic order effect. Comprehension accuracy and answering speed scores were analyzed through a mixed ANOVA with pairwise comparisons, which showed that the two sets of questions used in the study had a reasonably comparable level of difficulty: the speed and accuracy scores of groups 1 and 2 (first group of tasks in visual condition, second series of tasks in textual condition) showed no statistically significant difference despite the groups had sets of questions. The same was true for group 3 and 4 (first group of tasks in textual condition, second series of tasks in visual condition). The analysis confirmed the existence of a learning effect, as there is a comparative improvement in solving the second series of tasks, albeit this effect was not strong enough to override the main experimental effect. Overall, the randomization procedure was effective and since no systematic bias affected the results.

Then speed and accuracy scores obtained in both experimental conditions were analyzed through a paired-samples t-test. Table 3 reports the mean of answering speed and comprehension accuracy scores in textual and visual condition, as well as their differences. The result of the analysis shows that there are very statistically significant differences in speed ($t = -6.206, p < .001$) and accuracy

($t = 4.238, p < .001$), thus confirming hypotheses 1 and 2: the visualized version of the JYSE terms, compared to the traditional, text-only JYSE terms, allows for faster and more accurate comprehension of the content.

TABLE 3: Mean answering speed and accuracy. Statistical significance of the difference of means assessed through a paired-samples t-test.

| | Visual condition | | Textual condition | | Difference of means | T-test difference significance (two-tailed, $p < .001$) |
|-----------------------------|------------------|---------|-------------------|---------|---------------------|--|
| | Mean | SD | Mean | SD | | |
| Answering speed (seconds) | 818.979 | 222.791 | 990.612 | 219.216 | - 171.633 | - 6.206 |
| Answering accuracy (points) | 4.170 | .734 | 3.629 | .888 | .541 | 4.238 |

The effect of diagrams on answering speed and comprehension accuracy was further investigated through regression analyses, including control variables and relevant interaction terms in the model (Table 4–6). All variables involved in the interaction terms were centered to avoid multicollinearity between these terms and their individual components, as recommended by Aiken and West (1991, pp. 37-38). Since each participant obtained a score on the dependent variables in both textual and visual condition, both scores were included in the analyses (thus, $N = 144$).

Arguably, scores in a given condition may have been influenced by individual characteristic of the research participant: for instance, a “visualizer” could perform particularly well in the visual condition; or a “verbalizer” could excel in textual condition. Similarly, subjects with many years of experience in procurement or with a deep knowledge of the JYSE terms may have performed particularly well in textual condition, as the document used was the original JYSE 2009 SERVICES that they customarily used in their work. However, the results of the regressions show that the only statistically significant coefficient positively correlated with both answering speed and comprehension accuracy is the experimental condition: that is, any difference in scores is uniquely caused by the document format, and not by individual characteristics of the research participants. Hypotheses 1 and 2 are thus fully supported.

TABLE 4: Descriptive Statistics and Correlations

| Variable | Mean | s.d. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---------------------------------------|--------|--------|---------|--------|------|--------|--------|--------|-------|---------|---------|
| 1. Answering speed | 904.79 | 236.47 | | | | | | | | | |
| 2. Answering Accuracy | 3.899 | .856 | -.118 | | | | | | | | |
| 3. Experimental treatment | .500 | .502 | -.364** | .358** | | | | | | | |
| 4. Age | 40.880 | 10.7 | .033 | .020 | .000 | | | | | | |
| 5. Gender | .690 | .462 | -.132 | .023 | .000 | .091 | | | | | |
| 6. Years of experience in procurement | 6.967 | 6.57 | .113 | .140 | .000 | .272** | .019 | | | | |
| 7. Knowledge of JYSE | 5.260 | 2.01 | -.110 | .103 | .000 | .160* | .042 | .303** | | | |
| 8. Spatial-imagery skill score | 2.832 | .506 | -.074 | .026 | .000 | .011 | -.194* | .020 | -.005 | | |
| 9. Object-imagery skill score | 3.252 | .652 | -.067 | -.149 | .000 | .221** | .487** | -.011 | .008 | -.046 | |
| 10. Verbal skill score | 3.14 | .448 | .030 | .079 | .000 | -.137 | .038 | .080 | .108 | -.195** | -.257** |

$n = 144$ * $p < .05$ ** $p < .01$

TABLE 5: Results of the regression analysis (answering speed as the dependent variable)

| Variables | Coefficients |
|--|---------------------|
| Experimental treatment (0 = textual; 1 = visual) | -.364** |
| Age | .034 |
| Gender | -.155 |
| Years of experience in procurement | .155 |
| Knowledge of JYSE | -.160 |
| Spatial-imagery skill score | -.103 |
| Object-imagery skill score | .006 |
| Verbal skill score | .027 |
| Treatment x years of experience | -.022 |
| Treatment x Knowledge of JYSE | .136 |
| Treatment x Object-imagery score | -.021 |
| Treatment x Spatial-imagery score | .026 |
| Treatment x verbal skill score | .019 |
| Adjusted R ² | .138 |
| R ² | .212 |
| F | 2.762 |
| Significance of the model, p | .002 |
| n = 144 ** p < .001 | |

TABLE 6: Results of the regression analysis (answering accuracy as the dependent variable)

| Variables | Coefficients |
|--|---------------------|
| Experimental treatment (0 = textual; 1 = visual) | .358** |
| Age | .016 |
| Gender | .125 |
| Years of experience in procurement | .110 |
| Knowledge of JYSE | .062 |
| Spatial-imagery skill score | .042 |
| Object-imagery skill score | -.206* |
| Verbal skill score | .016 |
| Treatment x years of experience | -.134 |
| Treatment x Knowledge of JYSE | -.036 |
| Treatment x Object-imagery score | .069 |
| Treatment x Spatial-imagery score | -.129 |
| Treatment x verbal skill score | -.101 |
| Adjusted R ² | .167 |
| R ² | .242 |
| F | 3.211 |
| Significance of the model, p | < .001 |
| n = 144 * p < .05 ** p < .001 | |

Interestingly, high object-imagery skill is significantly inversely correlated with answering accuracy. A possible explanation is that object-imagers tend to process information holistically (Kozhenikov et al.2005), while understanding a contract requires a sequential analytic processing style – which is characteristic of verbalizers and spatial-imagers.

Next, I analyzed the user experience measures. The HED/UT scale revealed users’ perceptions towards the two versions of the JYSE document, in terms of utility and pleasantness. The results are summarized in Figure 6. The JYSE Visual Guide scored better in both dimensions: it was perceived not only as more functional (UT-visual = 3.8; UT-textual = 3.6), but also more pleasant to use (HED-visual = 4.9; HED-textual = 2.6) than the original. These differences, assessed through a Wilcoxon non-parametric t-test, were very statistically significant for the hedonic quality dimension ($t = 6.391, p < .001$), while trending towards significance for the utilitarian quality dimension ($t = 1.685, p = .092$).

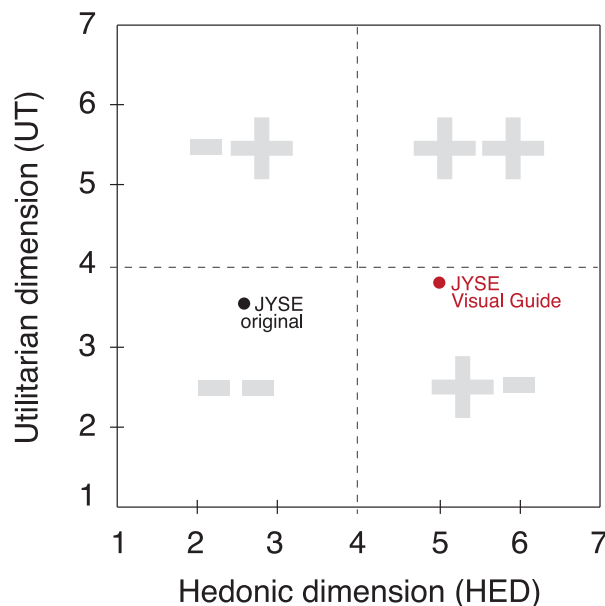


FIGURE 6: Evaluations of JYSE Visual Guide versus original JYSE terms, reported on the Hedonic/Utilitarian scale matrix

It is worth noting that the UT-scores for both versions remained below the sufficient score of 4. During the focus group, many participants revealed their misgivings about the general usefulness of the JYSE terms, because of a lack of clear guidelines on when to incorporate them fully or partially in contracts. Others pointed out that they would have preferred the diagrams and icons to be incorporated in the official document, rather than collected in a separate guide, to avoid switching between two documents. The general perceived low-functionality of JYSE can be explained by these shortcomings. The vast majority of the research participants expressed their enthusiasm for the JYSE Visual Guide during the focus group, finding it clear, useful and easy to use. Several participants wished that also other general procurement T&C’s currently used in Finland (e.g. for the purchase of goods, construction projects, and IT projects) would be complemented with a visual guide, and asked the researchers to relay their request to *Kuntaliitto*.

These qualitative insights are mirrored by the results from the I-PANAS-SF questionnaire, which measured positive and negative affective responses. The results (Figure 7) show that median positive affect (PA) increases, and median negative affect (NA) decreases when using the JYSE Visual Guide (PA = 17.986 ; NA = 7.069) instead of the official JYSE (PA = 15.583 ; NA = 9.305). The differences in both PA and NA (Table 7), are very statistically significant ($p < .001$).

Concluding, Hypothesis 3 is also confirmed, as the user experience of the JYSE Visual Guide, compared to the original JYSE, is more positive, both in terms of perceptions and affective response.

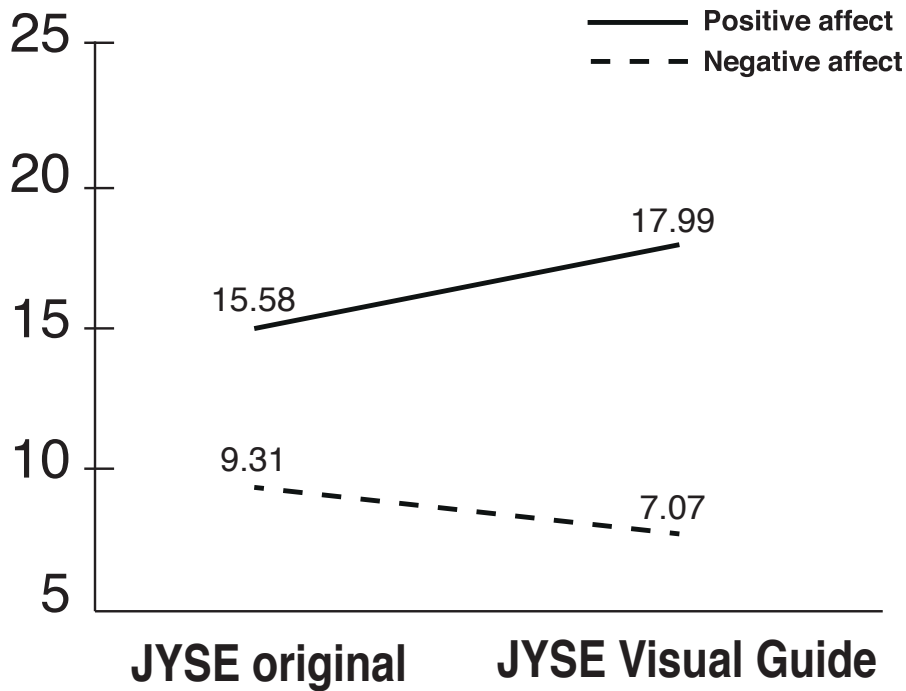


FIGURE 7: Mean Positive and Negative Affect, assessed through the I-PANAS-SF scale. The visual comparison shows an increase in PA scores and decrease of NA scores while using the JYSE Visual Guide.

TABLE 7: I-PANAS-SF scores on mean Positive and Negative Affect. Statistical significance of the difference of means assessed through a Wilcoxon non-parametric t-test.

| | Visual condition | | Textual condition | | Difference of means | T-test difference significance (two-tailed, $p < .001$) |
|-----------------------------|------------------|-------|-------------------|-------|---------------------|--|
| | Mean | SD | Mean | SD | | |
| Positive Affect (PA) | 17.986 | 3.81 | 15.583 | 3.34 | 2.403 | 5.283 |
| Negative Affect (NA) | 7.069 | 2.795 | 9.305 | 3.231 | - 2.236 | - 4.759 |

6. Discussion

Using diagrams (flowcharts, swimlanes, timelines) and icons significantly improved comprehension accuracy and answering speed among civil servants. These results converge with those of previous studies on visual alternatives to prose in instructions (for a review, see e.g. Michael & Hartley, 1991), especially in regards to contract documents (e.g. Kay & Terry, 2010; Mamula & Hagel, 2015). The effectiveness of the diagrams employed in the JYSE Visual Guide is consistent, theoretically, with the predictions of cognitive load theory. By presenting information in ways that support reading, inference-making and interpretation (Sweller, 1994), ‘extrinsic’ cognitive load – a cause of comprehension errors and slow reading (Jarrett et al, 2010) – can be reduced.

Diagrams were a more effective format, also because they presented information in a way that best answered users’ questions (Ganier, 2004). We knew that civil servants were likely to consult contractual documents in case of problems with the supplier, and we designed diagrams that would simplify finding answers to questions such as: “Is it our responsibility, or theirs?”, “What rules apply to this case?”, “What are we allowed to do?”, “What is the best course of action to solve or minimize this problem? What should we do?”. In the original document, readers found answers by searching and integrating information scattered in different clauses, on different pages – a cognitively taxing task that was minimized in the Visual Guide. As suggested by the higher error rate, prose was less effective than diagrams in eliciting correct problem representations and offer problem-solving strategies (Schnotz & Banner, 2003).

A particularly positive result was the absence of the so-called *expertise-reversal effect* – i.e. instructional methods that work well with novices may be not very effective for experts, and viceversa (Kalyuga, 2007; Lambiotte & Dansereau, 1992). The Visual Guide was a useful comprehension tool for novice and veteran civil servants alike.

Interestingly, as emerged in focus group discussions, participants were aware of how design conventions and familiarity facilitate comprehension (Kostelnick, 1990). Many felt that the Visual Guide was easily learnable to use, but that they had been relatively “slow” using it, because it was something new and they “*knew the old document almost by heart, so it’s almost like cheating*”. They believed they would have performed better if they had been more familiar with the Visual Guide. Despite these perceptions, the participants had been, in fact, significantly faster with the Guide. This suggests that answering accuracy and speed may still improve after adopting the new document.

The results also illustrate how diagrams can positively affect user experience. The JYSE Visual Guide was perceived as more pleasant, functional, and less stressful to use. Experiential quality was sought as an indicator of future acceptance of the Visual Guide. More positive first impressions may motivate disengaged users to try using the new document; and effortless interactions may ensure repeated use. Moreover, Wright (2015) posits that workplace readers disregard information that they believe is not addressed to them. Ensuring that the JYSE Visual Guide is not perceived as ‘something for lawyers’ may have contributed to the overall satisfaction with its design.

6.1. Generalizability of the results

The external validity of the results is ensured by the experimental setup of the study, which allowed controlling for potentially confounding variables. Randomization and post-hoc tests also helped avoid biasing order effects. Further precautions were taken to increase as much as possible ecological validity, which may be low in lab experiments: 1) the documents used in the experiment were real ones; 2) the comprehension tasks were modelled after plausible tasks that civil servants may have to accomplish; 3) the tests were carried out with a relevant subset of its intended users (procurement professionals working in public organizations).

On these grounds, the positive effects of diagrams on the comprehension of JYSE can be generalized, in a narrow sense, to other public procurement T&C's and contractual documents – for an audience comprising civil servants. However, since JYSE is also a representative example of legal-bureaucratic instructions, the results may generalize more broadly to other similar documents, which seek to prescribe the actions, rights, duties, prohibitions and obligations of actors within a governmental setting.

One of the design targets of the JYSE Visual Guide was to motivate people in public procurement and potential suppliers to read and engage with the document. However, this goal can only be evaluated in the long term, outside of an experimental setting. The current study resorted on proxy indicators of self-efficacy – the belief in one's ability to successfully perform a task with a certain system – which affects whether users will ultimately adopt new solutions (Ellen et al., 1991). The JYSE Visual Guide in fact elicited feelings of satisfaction and competence (as assessed through UT scores and focus groups discussions). This finding may be cautiously extrapolated to indicate good chances of successful future adoption.

6.2. Limitations

Despite its merits and strengths, the experimental methodology has also some weaknesses: the process of completing comprehension tasks cannot fully reflect the naturalistic patterns of document use likely to be found in the workplace (Renkema, 2001). People do not only obtain knowledge from documents, but also from colleagues and other sources. Moreover, readers may be unable to assess whether they do have a problem, and where to search for an answer. The current results are thus limited to certain patterns of interaction with the document: when an employee is able to assess the situation at hand, can formulate the need for information, knows where to search for an answer, and finally decides to look at the terms.

Secondly, some comprehension mistakes happen because employees *think* they know the correct information, and thus do not feel the need to look at the original source material. This type of mistake cannot be solved through more effective instructional approaches alone. Training is crucial. As the research participants suggested during the focus group, the JYSE Visual Guide could work very well as a training aid, and as the first-stop-for-information for new, less experienced employees.

Lastly, the study failed to involve representatives from potential suppliers both in developing and testing the Visual Guide, limiting the generalizability of the findings. Although *Kuntaliitto* was primarily interested in helping its own stakeholders (civil servants), contracts can only succeed if both parties are compliant, and thus the perspective of vendors is crucial to ensure clarity and collaboration between public and private organizations.

The current shortcomings may be ameliorated through a mixed methods approach within the frame of a single or comparative case study. Rigorous experimental evaluation could be complemented with insightful, reliable qualitative data.

6.3. Producing visual documents in public organizations: further reflections⁶

The theoretical section of this article pointed at the barriers to adopt visual formats in government settings, especially when the audience is not the general public. The key findings of this study do not provide solutions on how to overcome these barriers, although they may persuade institutions of the importance of change. Further insights can be offered by reflecting on the design process of the JYSE Visual Guide.

Let's start from the extent of the benefits. Diagrams in public documents are not only a boon for potential readers: diagrams can help government writers, lawyers and decision-makers to review and improve the quality of the clauses more easily, spotting at a glance missing provisions and illogical rules (Australian Government Office of Parliamentary Counsel, 2013, p.11; Berman, 2000, p.24). In this case, for instance, the lawyers from *Kuntaliitto* were able to notice several shortcomings in the current procurement terms. These mistakes became apparent during the workshops, when lawyers were engaged to collaboratively sketch the flowcharts with designers. These experts had never noticed before such inconsistencies, since it was very difficult to spot them by reading the clauses in the 'serial' way afforded by prose (Doumont & Vandebroek, 2002). Diagrams offered a whole new perspective on the content. As a result, *Kuntaliitto* lawyers were able to create a list of suggestions for improvement, which was submitted to the Ministry of Finance, and ultimately led to the drafting and publication of new JYSE terms in 2014 (which, however, did not include diagrams or other visuals). Sketching diagrams are not only necessary to better communicate regulations, but to draft better ones.

The JYSE case also hints at some options on how to realistically implement multimodal documents in a governmental setting. Firstly, government officials need research results and examples as bases to propose changing the status quo. In this case, I was involved in the project because the *Kuntaliitto* lawyers in charge had read some of my research papers (e.g Passera & Haapio, 2011a; Passera, 2012) and were aware of the positive results from a Canadian pilot on redesigning legislation according to plain language and plain design principles (Berman, 2000; GLPi & Schmolka, 2000). Arguably, the interest to improve the functionality of public documents by means of design would grow as more models, ready-made modifiable visual templates, examples, and sources of inspiration – as well as research evidence – become available, and inspire other institutions to redesign their own documents. The change may be slow at the beginning, but could grow exponentially as latecomers start adopting and appropriating the approaches and examples developed by pioneering early-adopters. As the *functional* role of visual language would start to be understood and demonstrated, it may become more obvious and well-justified for government decision-makers to invest in design expertise, training, and software. Without the correct mindset, understanding, and the willingness to adopt new practices at

⁶ Although any generalization is elusive, I decided to include these reflections, since they may be of great value to researchers and practitioners facing the same problems in similar contexts. In fact, according to Flyvberg (2006), the *force of example* of concrete, context-dependent cases plays a crucial part in the "cumulative development of knowledge" – offering depth of understanding rather than breadth.

individual, team and organizational levels, no amount of training is successful in creating change (Janssen, 2001).

Secondly, multidisciplinary collaboration and first-hand experience is crucial. In order to foster change through successful (re)design projects, legal experts and decision-makers need to be involved from the very beginning (Schriver, 2015), and optimally as co-creators (Waller & Waller, 2015). In this case, lawyers had a first-hand experience of the design process, and focused, together with the whole team, on finding viable solutions and compromises, rather than hindering or boycotting the project. They were asked to create and modify sketches, bringing their expertise and perspective into the designs. Perhaps lawyers and public writers will never transition to full-fledged multimodal document designers. However, they could produce ‘legally-validated’ rough sketches and mock-ups, which could be easily finalized by a designer, and deployed more quickly (and cheaply).

This approach offers a solution to the third issue – whether collaborating with external designers (or hiring them in public organizations) prohibitively affects production time and costs. As this study shows, lawyers creating rough sketches as raw materials for designers considerably speed up the process. Another way to make sensible investments in good design is to prioritize working on documents which will be used, unchanged, for a long period of time (Janssen, 2001, p. 106). Focusing on creating or redesigning “stable” documents, which are not created and modified on a day-to-day basis, would also avoid the issue of how to provide civil servants with the necessary design tools and skills. Lastly, public organizations could resort to collaborations with students specializing in graphic and information design⁷. Inexpensive experimental pilots can get buy-in more easily, and especially if successful could pave the way for more ambitious projects with experienced professionals. At the same time, students would benefit from real-life chances to test their skills, develop civic engagement, and find meaningful graduation projects.

7. Conclusions and suggestions for future research

This article identified three types of diagrams (flowcharts, swimlane tables, and timelines) suitable to represent legal-bureaucratic instructions, and found that they led civil servants to understand public procurement T&C’s faster and more accurately. The findings contribute to the growing literature on ‘contract visualization’ in two ways: it offers empirical evidence to support the proposition of using visual representations to make contracts more understandable; and it confirms the results of early studies, which were not sufficiently rigorous in methodology. The proposed conceptualization of “contracts as instructions” suggests the opportunity for technical communicators and information designers to lend their skills to the field of law, and explore solutions beyond layout and plain language.

The study also contributes to the field of document design in government settings. Firstly, previous research has focused mostly on overall document and layout issues in primarily textual documents or forms, while this study explores more thoroughly the potentiality of visual formats. Secondly, previous research has focused mostly on public or government-to-citizen communication. I argue for the need to also address the information needs of ‘insider’ audiences, which display the characteristics of workplace readers (Wright, 2015) and are faced with the “impracticable task” of reading thousands of pages every month (Neutelings, 2001). Attention

⁷ At least in Finland, there is a strong tradition of collaboration with universities, and it is common for public and private organizations to sponsor student projects and theses. *Kuntaliitto* took this approach into consideration.

should be paid to the problems arising when these readers from badly designed documents: poor communication leads to mistakes, inefficiencies and information avoidance, resulting into ineffective organizational action – with negative socio-economic repercussions that impact the whole community.

In order to create best practices and motivate public organizations to adopt more visual approaches, there is a need for models on how to effectively design/redesign public documents, paired with trustworthy data from user evaluations. Future research could expand the venues of investigations suggested in the current study. For instance, other types of explanatory visualizations suitable for legal-bureaucratic documents (different types of diagrams, and other types of visual solutions, such as color coding systems; icon systems; visual metaphors; comics...) could be identified and compared in different scenarios of use. Alternatively, future studies could focus on the possibilities of co-designing explanatory visualizations with experts and end users, or follow the process of adoption and use of radically visual documents. Moreover, this study's concern with the information problems and needs of audiences *within* public organizations could be further investigated, focusing on different document types, contexts of use, and goals.

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10. Author biography

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