

# User-friendly Contracting Tools – A Visual Guide to Facilitate Public Procurement Contracting

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## ***Abstract***

In order to achieve successful business outcomes, it is crucial for all the parties to know their rights and obligations and how to best react to unexpected situations. Public procurement processes, however, often focus on obeying competitive tendering regulations, neglecting the importance or even the existence of contracts. There is a need to envision new, better ways to engage civil servants with contracts, so that they can be used strategically in achieving successful collaboration with suppliers and, consequently, providing high quality services to the citizens. This paper presents a development case, where a visual guide, designed to support the understanding of a set of general terms of public procurement, was produced and experimentally evaluated with users. Visualization is used to make the terms easier to use and understand, as well as to transform contracts from legal documents to communication tools.

## ***Keywords***

Contract visualization, public procurement, proactive contracting, usability, user experience, user tests, experiments.

## **1 Introduction**

One of the most important requirements for successful business outcomes is that all the parties understand what the deal is about, what their rights and obligations are, what they

are supposed to deliver and what they are entitled to expect of their partners. Contracting processes and contract documents are tools for enhancing this comprehension. This is, however, not how contracts are usually understood. When they are seen through a traditional legal logic, they are documents to be interpreted at court or in the shadow of law i.e. according to legal interpretation principles. They are prepared for legal disputes instead of promoting successful collaboration, which is usually a prerequisite for successful business. If a common problem in business contracting is that contracts are considered as legal documents with hardly any connection to the business in question, in public procurement the relation to contracts is even more distanced. As public procurement is often considered as a synonym for competitive tendering the focus is on obeying the competitive tendering regulation, and the significance, or even the existence, of contracts may be ignored (Pohjonen & Koskelainen 2012).

This paper presents a development case, where a visual guide, designed to support the understanding of a set of general terms of public procurement, was produced and evaluated with users. The aim is to present an innovative user-centered contracting tool as well as experimental data to argue for the benefits brought forth by visualization in the “verbocentric” realm of contracts. Firstly, we introduce the theoretical basis of our development and testing approach, based on principles from Proactive Contracting and information design, as well as on the concepts of boundary object, triological learning and co-creation. Then, we present the visual guide, how it was developed, and the design of an experimental evaluation aimed at assessing its effectiveness. We conclude by discussing the results of the experiment, their limitations and their implications for practice.

## **2 Theoretical Background to the Case: Proactive Contracting and Information Design**

Our view on contracts and contracting is based on the Proactive Contracting approach (the first compilation Pohjonen ed. 2002) more broadly named Proactive Law (e.g. Pohjonen 2006, Siedel & Haapio 2010, Berger-Walliser 2012). Proactive Contracting takes as a starting point the contracting collaboration in the real world practice as well as needs arising from there. It attempts to enhance expertise, which promotes success in contracting collaboration. It has been developed together with cross-disciplinary academic researchers and cross-professional experts in contracting practice. In Proactive Contracting, ideal contracts and contracting processes are seen as user-friendly working tools for enhancing successful knowledge sharing and knowledge co-creation. Proactive Law attempts to enlarge the scope of legal interest to include the relation between law and legal instruments as realizers of goals in the real world.

When contracts are seen as tools, contracting collaboration is not solely a relation between the parties, but also a relation between the parties and these tools. Becoming thus focal points in collaboration, reconciling the diverse worlds and understandings of the different groups involved, contracts can be seen as boundary objects, i.e. mediating artifacts or

instruments which facilitate the crossing of knowledge boundaries in cross-professional collaboration, by facilitating the transfer of understanding across different communities (Carlile 2002, Bechky 2003; Star and Griesemer, 1989). Paavola and Hakkarainen (2005) have distinguished a *triological approach to learning*. It concentrates on interaction through boundary objects, which they call mediating artifacts or processes of activity. Interaction is not, thus, seen as an action just between people, or between people and environment but facilitated with the help of a boundary object. On one hand, boundary objects facilitate collaboration. On the other hand, they are further developed in collaboration processes. Functional working tools should be user-friendly facilitators of knowledge co-creation and knowledge sharing, what Levina and Vaast (2005) would call *boundary-object in-use*, embedded in the specific context and everyday practices of the actors who use them, as opposed to a *designated boundary object*, tools nominated as being symbolically relevant, but lacking a deeper adaptation to the practices of different groups of actors. In the case of contracts, such deeper adaptation is missed, and they remain simply taken for granted, lawyerly seals of approval in the eyes of those without a legal background.

As contracts are physical artifacts, ideally aimed at transferring information and freezing the common understanding, their design characteristics should matter. As we mentioned, we are not observing a dialogue between the parties, but a *triologue* of the parties through and with the contract. The *affordances* of contracts – the qualities that allow an individual to perform a certain action – should be made concretely visible (Passera and Haapio, 2013) to better support communication and collective sense-making. This practice is called *contract visualization*, a subset of knowledge visualization (a field of study that investigates the power of visual formats to support the cognitive processes of generating, structuring, sharing and retrieving knowledge), which uses information design methods to make contracts clearer and more user-friendly (Passera and Haapio, forthcoming).

Visualization facilitates the sharing of knowledge, concretely making the invisible visible and providing meaningful structures to interpret the complex relationships existing in information. Visual meaning making is often more effective than textual communication. People are drawn towards visual representations and are able to comprehend their messages at a glance. Emotion is critical for the appropriate direction of attention (Damasio 1999, 273). A much better way to protect the realization of the actual will of the contracting parties is to facilitate their common understanding, rather than to dispute in court afterwards. If people are expected to familiarize themselves with information, according to the principles of user-centered design, the representation of this information should match the needs of its prospective end-users. User-centered information should, for example, be easy to find, be presented in a usable format, be perceptually attractive, and finally enable the user's elaboration and development of the information through participation (Beyer & Holtzblatt 1998).

Due to the legal and administrative command-and-control tradition, public procurement processes and documents are usually difficult to understand and forbidding. They have not been developed for furthering collaboration. Public procurement that follows the logic of

collaboration provides a better platform for buying and selling products and services that are suited for their purpose. In collaboration, the focus turns to enabling knowledge sharing, motivating and inspiring.

Proactive contracting and a new interest in the visual form of contracts, seen as boundary objects, characterize the development case and experimental research presented in this paper.

### **3 Development Case: a Visual, User-friendly Guide to Public Procurement**

#### **General Terms**

In Finland, the Ministry of Trade and Industry approved General Terms of Public Procurement (JYSE 1994) in accordance with the legislation that was then in place. Along with the new legislation the Ministry of Finance established a working group, which produced the current JYSE 2009 SUPPLIES and JYSE 2009 SERVICES (Finnish Ministry of Finance, 2009a and 2009b). These terms are commonly incorporated into procurement contracts. Their influence on the contracts is, nevertheless, not so commonly comprehended. They are often incorporated in their entirety without pondering if individual terms are in accordance with the needs and wishes of the contract relation in question.

Since the end of 2011 to mid 2013, the authors collaborated with the Association of Finnish Local and Regional Authorities (Kuntaliitto), in order to develop and test a visual guide that could make it easier for procurers in local government to comprehend the logic of JYSE and its significance to their contracts, as well as for companies who supply to local government. The goal of the guide is to display the terms in an appealing, user-friendly and easy-to-consult manner. The development of this visual guide was carried out under the framework of a wider research project on public procurement contracting, which provided the practice-based motivation for such work, based on the findings from 66 semi-structured interviews, participation in and observation of process simulations and workshops.

Often civil servants without a legal background can have difficulty in using the JYSE terms, both during contract-making and during implementation. They do not always become carefully and sufficiently acquainted with the terms. Nonetheless, they include the terms in their contracts believing that they offer a suitable solution to every purchase, while this should be assessed on a case-by-case basis: the parties might wish to agree otherwise in their contract, deviating from some JYSE clauses, or might not want to use the JYSE terms at all. Civil servants are not sufficiently aware of the possibilities and the limitations of the JYSE terms, and thus fail to use them strategically in designing successful collaborative relationships with the suppliers. JYSE terms are not easy to understand, and it is apparent that the original version was drafted with goods, and not services, in mind. The characteristics of services – intangible processes, requiring the “orchestration” of people, actions and tangible evidences of the service (e.g. spaces, documents, tools, etc.) (Shostack,

1984) – are not always carefully considered.

In visualizing contracts, it is usually possible to illustrate as clearly as possible what the contract means as it is for the parties to decide. However, general terms are more comparable to statutes. They cannot be quite unambiguous, as they need to be applied in varying situations. Compared with statutes or even with some other general terms, the JYSE terms are, perhaps, even more ambiguous. Statute interpretations may become established and general terms may be governed actively so that their interpretations may also be stabilized. This is not the case with JYSE. We were, thus, not able to visualize all of the cause-and-effect chains in JYSE, as there are no authoritative interpretations on unclear terms. On the positive side, as there are plans to renew the JYSE -terms, our work highlighted many ambiguities and contradictions, which were noted and may be reconsidered by the working group.

The JYSE Visual Guide was co-designed by a team including a lawyer from Kuntaliitto and three researchers (including the authors of this paper), two with a law background and one with a design background. During the project, in addition to individual design and drafting work, we had over ten full-day workshops in which we improved and revised the Guide, by sketching alternative visualizations, experimenting with different wordings and rearranging the whole document structure. The Guide was developed following an iterative process, continuously collecting feedback and probing in order to reduce ambiguity as much as possible through wording, visuals and layout. In its final version, the JYSE Visual Guide includes four types of visualizations:

1. A “bullseye” diagram, showing the hierarchy of legal sources concerning public procurement contracts applying JYSE (Figure 1)
2. Nine supplier/purchaser swim-lane tables, listing the responsibilities of each party (Figure 2)
3. Eight flowcharts, explaining different courses of action possible in the wake of changes from what was agreed, such as price changes, delays and defects (Figure 3)
4. Ten timelines, explaining different possible ends to the contract term, either agreed or due to termination or cancellation (Figure 4).

Comments and feedback were provided by the procurement units of two Finnish cities, a law firm, and lawyers in Kuntaliitto, who were not involved in the development of the Guide. Finally, before the Guide was publicly released, we tested it with civil servants of seven municipalities and with employees working in the procurement units of two hospital districts. The results of these tests are presented and discussed in this paper.

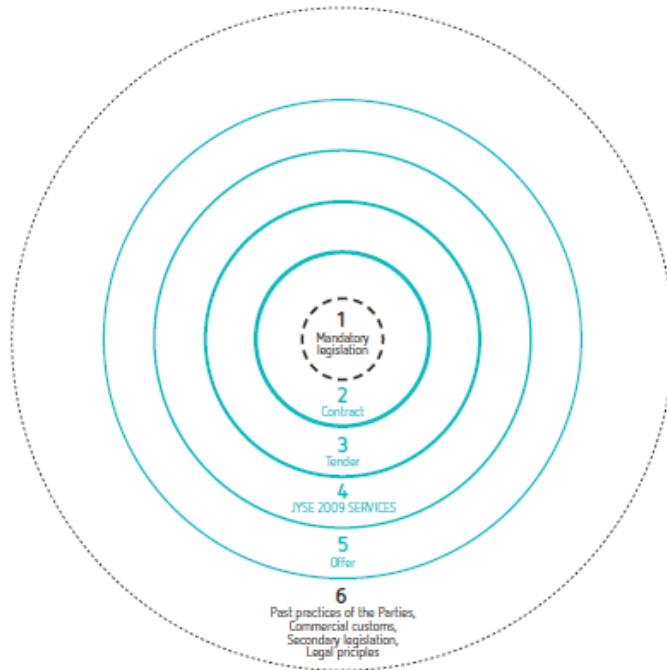


Figure 1: Bullseye visualization representing the hierarchy of legislation and documents.

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	 <b>Purchaser</b>	 <b>Service provider</b>
<b>CONTACT PERSONS</b>	<p>§3.1</p> <p>Each party shall designate shall nominate a contact person whose task is to supervise and monitor the implementation of the contract and to communicate on issues relating to the implementation of the contract. Contact persons and their changes shall be notified in writing to the other party.</p>	<p>TO DO</p>
<b>SUBCONTRACTORS</b>	<p>§4.1</p> <p>For good cause the customer may refuse to approve a subcontractor.</p>	<p>§4.1</p> <p>The service provider may commission a subcontractor to perform its contractual obligations.</p> <p>§4.1</p> <p>The service provider shall be responsible for the work of the subcontractor as if it were its own. The service provider shall also be responsible for ensuring that the subcontractor fulfils the service provider's contractual obligations.</p> <p>§4.1</p> <p>The service provider must notify for the customer's approval the main subcontractors used by the service provider in providing the service.</p> <p>TO DO</p>

Figure 2: Supplier/Purchaser table, listing the responsibilities of the parties before the service can start.

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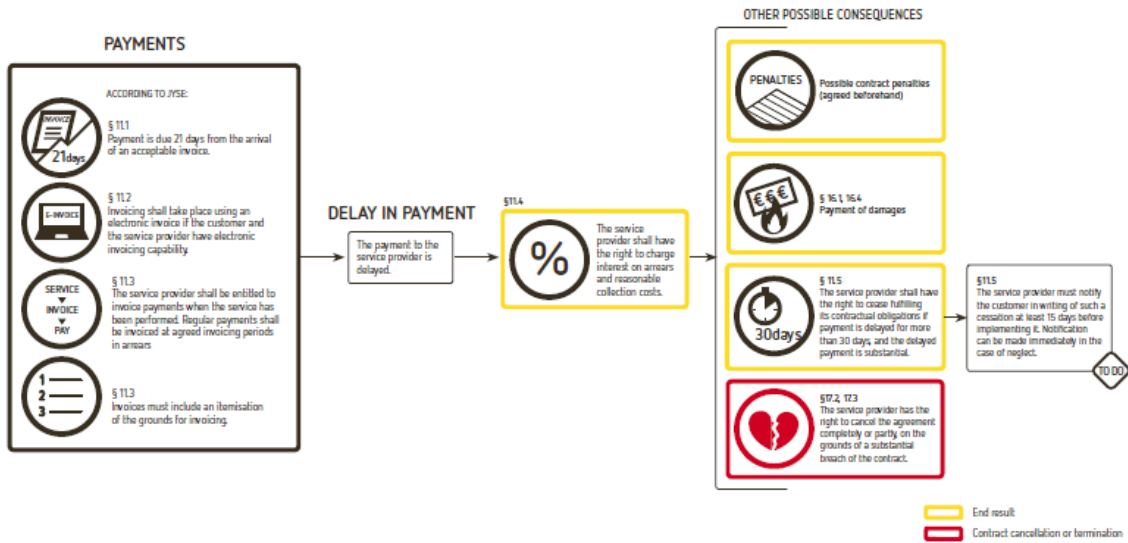


Figure 3: Flowchart illustrating payment procedures and the consequences of a delay in payment.

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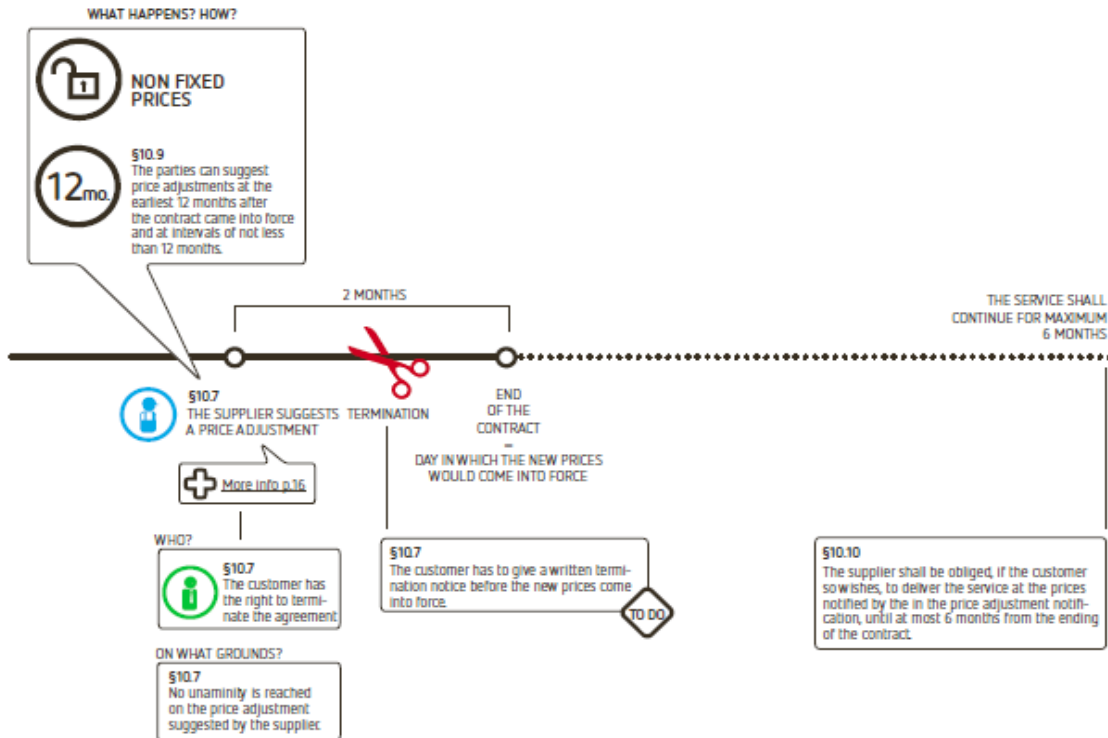


Figure 4: Timeline illustrating contract termination in case the Parties do not manage to agree on a price adjustment suggested by the supplier.

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## 4 Hypotheses

The experiment was designed to compare the JYSE Visual Guide with the original JYSE, an all-text document, in order to assess whether the new document could actually support better understanding and ease of use. Based on previous experimental research (Passera, 2012; GLPi and Schmolka, 2000, Kay and Terry, 2010), we hypothesized that displaying legal content visually can help readers access and focus on the content more easily, as the cognitive load is distributed on different information processing systems, preventing information overload (Keller & Grimm, 2005) and leading to a faster, more accurate information processing (Kirsh, 2010). Such efficiency and effectiveness of use can be defined as **usability**: “The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use” (ISO, 1998). This definition points out that usability can be intended as an objective measure of efficiency and effectiveness, but also as a subjective evaluation of the functionality of a product, a system or a document, as perceived by the users.

However, when comparing the original JYSE document to the JYSE Visual Guide in terms of usability, we need to consider that the “true” usability results could be confounded by the fact that participants might know the correct answer, or where it is located in the original document, in advance. In this case, they would rely on their memories, rather than on pure perception and cognition, to elaborate an answer. The JYSE 2009 SERVICES is a well-known document, a standard “tool of trade” in public procurement, while the JYSE Visual Guide has an innovative format and structure, unfamiliar to the participants, who used such a guide for the first time during the experiment. A more precise comparison could be reached if participants have an equal amount of familiarity with both documents. Since we needed a reasonable control “baseline” in order to assess the effectiveness of the JYSE Visual Guide, we decided to adopt the original JYSE 2009 SERVICES as a comparison document anyway, and consider the test successful in case the new Visual Guide performed better or at least as well as the original document. Summarizing, the improvements in usability caused by displaying information visually are hypothesized as the following:

**H1a:** The visual version of the document supports faster reading and information finding

**H1b:** The visual version of the document supports more accurate understanding of information

**H1c:** The visual version of the document elicits a more positive subjective evaluation of usability

The subjective evaluation of a document is not limited to how usable the reader perceives the document to be. Current design and human-computer interaction research has expanded its concerns beyond usability, formulating the concept of **user experience** (UX), which can be defined, for instance, as “every aspect of the user’s interaction with a product, service, or



company that make up the user's perceptions of the whole" (Nuutinen et al, 2011). User experience has a strong affective, emotional and holistic connotation in how it pertains to the "entire set of affects that is elicited by the interaction between a user and a product, including the degree to which all our senses are gratified (aesthetic experience), the meanings we attach to the product (experience of meaning), and the feelings and emotions that are elicited (emotional experience)" (Hekkert, 2006). We determined to measure how visualization affects user experience, because research has shown that the aesthetic quality of a system affects its overall evaluation and acceptance, according to a "what is beautiful is good" phenomenon (Tractinsky et al, 2000). This implies, too, that "what is beautiful is usable" (Tractinsky et al, 2000) and leads us to hypothesize less perceived difficulty in using the visual version of the JYSE terms.

Several authors see the reader's affective response to a document as ultimately affecting the motivation to read and the attention paid to it (Gribbons, 1991; Carliner, 2000). This is particularly important when dealing with legal documents, which are usually perceived as difficult and obscure, especially by people without a legal background. As one of the objectives of the JYSE Visual Guide was to engage civil servants in reading and better understanding the JYSE 2009 SERVICES terms, we considered positive affective and experiential responses as crucial measures to evaluate the quality of the Visual Guide, and we hypothesized that such positive affective responses will be higher for the JYSE Visual Guide than for the original, text-only document.

Summarizing, the improvements in usability caused by displaying information visually are hypothesized as the following:

**H2:** The subjects experience less difficulty in using the visual version of the document than the text-only version of the same document

**H3:** The visual version of the document provides a more positive experience than the text-only version of the same document

## **5 Design of the experiment**

The experiment was based on ten comprehension tasks, five to be answered using the JYSE Visual Guide (*Visual Condition*) and five using the original JYSE 2009 SERVICES terms (*Textual Condition*). The two experimental conditions were compared in terms of the number of correct answers and the speed in providing them. 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' experience of use, perceptions and opinions. In order to avoid procedural bias due to the so-called order effect (Cozby, 2009), in which participants might score better or worse in later tasks due to practice or fatigue due to the multiple repetitions of similar tasks, the order of the comprehension tasks was randomized, as well as the experimental condition associated with the tasks. Consequently, four different experimental possibilities were obtained (Table 1).

The study took place between April and May 2013, and was carried out in four different sessions. From a total of 26 participants, 24 responses were usable in the data analysis. The average age of the test participants was 41.5 years, and both genders were equally represented. The test participants can all be considered informed users, as they routinely use the JYSE 2009 SERVICES terms, or similar documents, in their work. 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”. The following sub-paragraph provides details on the dependent variables that were used to compare the original JYSE versus the JYSE Visual Guide.

<b>Group 1:</b> Completes tasks n° 1-5 in Visual Condition first; completes tasks n° 6-10 in Textual Condition after	<b>Group 2:</b> Completes tasks n° 6-10 in Visual Condition first; completes tasks n° 1-5 in Textual Condition after
<b>Group 3:</b> Completes tasks n° 1-5 in Textual Condition first; completes tasks n° 6-10 in Visual Condition after	<b>Group 4:</b> Completes tasks n° 6-10 in Textual Condition first; completes tasks n° 1-5 in Visual Condition after

Table 1: Randomization of task completion order and condition order across experiment subjects.

## 5.1 Measures

**Effective usability, or Performance** – Following similar previous studies (Passera, 2012; GLPi and Schmolka, 2000), the objective measure of usability has been assessed through the reader’s performance in comprehension tasks, measuring the number of correct answers given and the speed of providing such answers in seconds. Such measures were taken for each individual comprehension task.

**Perceived usability** – As perceived usability is the subjective measure of usability, we used self-reported scales validated in previous studies. A first measure considers the anticipated difficulty of use (pre-task) versus the effective difficulty of use (post-task) of the two documents. The participants were asked, before looking at any version of the terms, to indicate how difficult they thought it would be to use a contract – any contract – to find the correct answers to a series of comprehension questions. The participants were then allowed to have a look at one of the two versions of the JYSE terms, and the same question was repeated, this time by asking them to specifically indicate how difficult they thought it would be to use this precise document in such comprehension tasks. Finally, after carrying out a set of comprehension tasks with the aid of one of the documents, they were asked to assess how difficult it actually was to use the document to find and understand the information. The same questions were repeated before and after the second set of comprehension tasks, carried out with the other version of the document. For all the questions, the participants used a 9- points symmetrical categorical scale, ranging from *very, very low mental effort* to *very, very high mental effort*. This scale has been developed and used by Paas and Van Merriënboer (1994) by modifying a previous scale to measure perceived task difficulty

(Bratfisch, Borg, and Dornic, 1972), and it has been indicated as a simple, yet effective and sensitive measure of mental load (Paas and Merriënboer, 1994; Paas, 1992, Paas, Van Merriënboer, & Adam, 1994).

A second measure of perceived usability is offered by the utilitarian dimension (UT) in the HED/UT scale (Spangenberg et al, 1997), which is an attitude measurement scale, often used in consumer behavior literature (e.g. Voss et al, 2003), that captures the hedonic and utilitarian aspects of the attitudes of a user interacting with a product, a system or an event. The utilitarian dimension in this scale was used in this study to assess the opinion of the users on the degree of functionality and usefulness of the two different versions of the document, while the hedonic scale was used to assess the degree of affective, sensorial gratification perceived by the users interacting with each document.

Last but not least, the JYSE Visual Guide was also evaluated according to the System Usability Scale (SUS) (Brooke, 1996), which is a very widely used measure of perceived usability, due to its robustness and simplicity of application. The benefit of the SUS scale is that it provides some “universal” benchmark values as to what is average or good usability, thanks to a meta-analytical study of 500 existing cases and over 5000 user reports (Sauro, 2011).

**User experience** – For this variable we also used two self-reported scales validated in previous studies. The first measure is the hedonic dimension (HED) of the HED/UT scale (Spangenberg et al, 1997) that we introduced above. The hedonic dimension of this scale was used to assess the level of affective, sensorial gratification perceived by the users when using the document. It is relevant to note that both the HED and the UT dimensions of the scale provide an attitudinal insight to the *reasons* for a consumer to engage in consumption (or in our case, we argue, for a user to engage in use) (e.g. Batra and Ahtola, 1990), and thus it is an important measure to assess whether one version of the JYSE documents is more engaging than the other.

The second measure considers the emotional positive and negative response of the participants after using the documents. We used the I-PANAS-SF scale (Thompson, 2007), a shortened, internationally suitable version of the widely used Positive and Negative Affect Schedule (PANAS) (Watson and Clark, 1994), that is able to reliably assess the dominant dimensions of experience – the positive and negative affect. By using this scale it is possible to assess the positive and negative emotional reactions of users elicited by the usage of the two versions of JYSE.

## 6 Results

We first examine how the experiment participants differed in terms of performance, namely the number of correct answers and the speed in completing each task. 67.5 % of the tasks were completed correctly with the original JYSE and 73.3% with the JYSE Visual Guide. In terms of speed, the average time taken to complete a task was 198.98 seconds using the

original JYSE and 173.25 seconds using the JYSE Visual Guide. Thus, the JYSE Visual Guide performed better in accordance with both indicators (Figure 5). We performed a two-tailed paired t-test for statistical significance, and discovered that the difference in terms of speed between the visual and textual conditions was statistically significant ( $t(23)= 2.46, p <0.05$ ), while the difference in terms of correct answers was not statistically significant.

On the basis of this evidence hypothesis H1a is confirmed, but hypothesis H1b is not confirmed. This result could be explained by two factors. Firstly, while the display of the information in the two versions of the document differs considerably, the wording of the terms was more or less kept unchanged and legal language might still be a hurdle to comprehension for people without a legal background. Secondly, the participants might have relied on their pre-existing memories and interpretations, which, either correct or not, might have influenced how they read and understood the text. Interesting details emerged from the focus group at the end of the experiment: several participants from Groups 3 and 4 (those who used the original JYSE first, and the JYSE Visual Guide later) said that they, while using the Visual Guide, noticed that they had provided wrong answers when they had used the original JYSE. Others believed that, despite they personally felt that they knew the JYSE terms almost by heart, less experienced employees (especially new recruits or summer workers) might indeed take full advantage of the cognitive support offered by the Visual Guide. They also felt that the suppliers might benefit from the Guide, as they often have quite a poor knowledge of the JYSE terms.

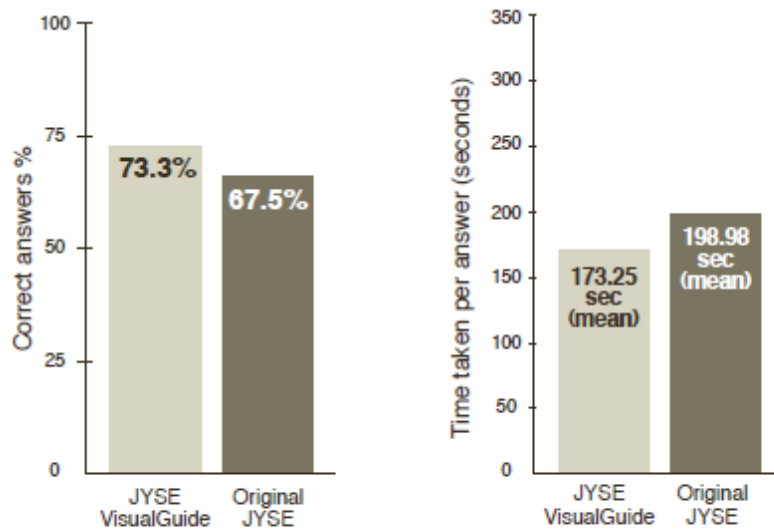


Figure 5: Accuracy and speed. Comparing the original JYSE vs. the JYSE Visual Guide

We now examine the differences of the two documents in terms of perceived usability. Considering the first measure, the SUS scale, which indicates how usable and learnable a system is perceived to be, the JYSE Visual Guide scored 73.65. In this scale a score of 68 is

considered average (Sauro, 2011), so the usability of the JYSE Visual Guide can be considered slightly above average, and equivalent to a B-grade if we were using a letter-grade system (from A+, highest, to F, lowest) (Sauro, 2011) or a “Good” if we were using an adjective rating system (Best Imaginable, Excellent, Good, OK, Poor, Awful, Worst Imaginable) (Bangor et al, 2009).

A second measure of perceived usability focuses on the anticipated difficulty of use (pre-task) versus the effective difficulty of use (post-task) of the two documents. The baseline average 73.3% score (“Imagine that you are asked to complete some comprehension tasks, using a contract, any contract. How much difficulty do you expect to experience?”) was 6.25 on a 9-points scale, where 9 is “extremely difficult” and 1 is “not difficult at all”. After being shown both the original JYSE and the JYSE Visual Guide, the question was repeated in relation to the specific document in use. The expected difficulty for the original JYSE was 6.5 points average, while for the JYSE Visual Guide it was 6.2 points average. After completing the tasks, the participants assessed the difficulty of finding information and the difficulty of understanding information in both documents. The average scores were 6.6 (“finding”) and 6.3 (“understanding”) for the original JYSE and 5.4 (“finding”) and 5 (“understanding”) for the JYSE Visual Guide. The results are summarized in Figure 6.

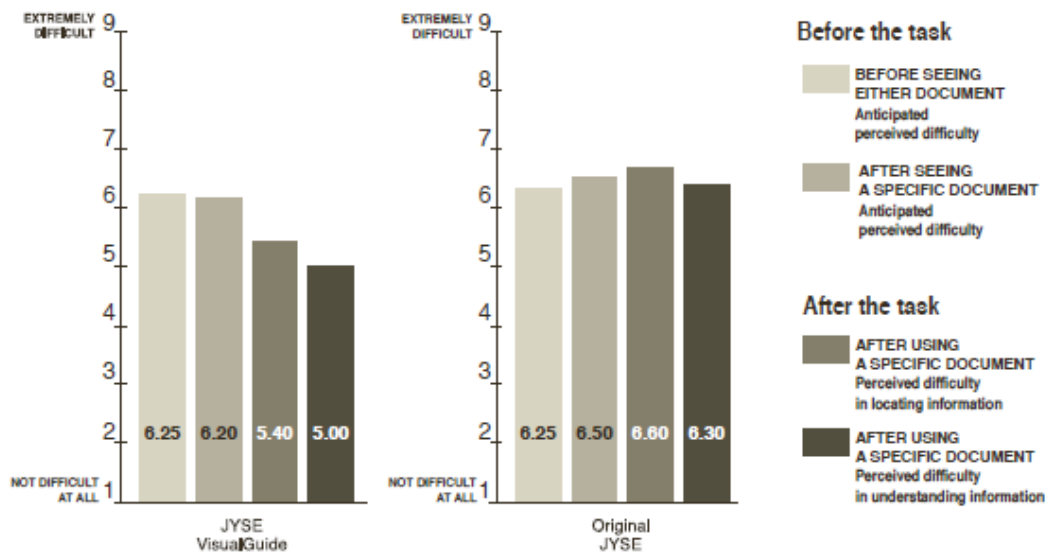
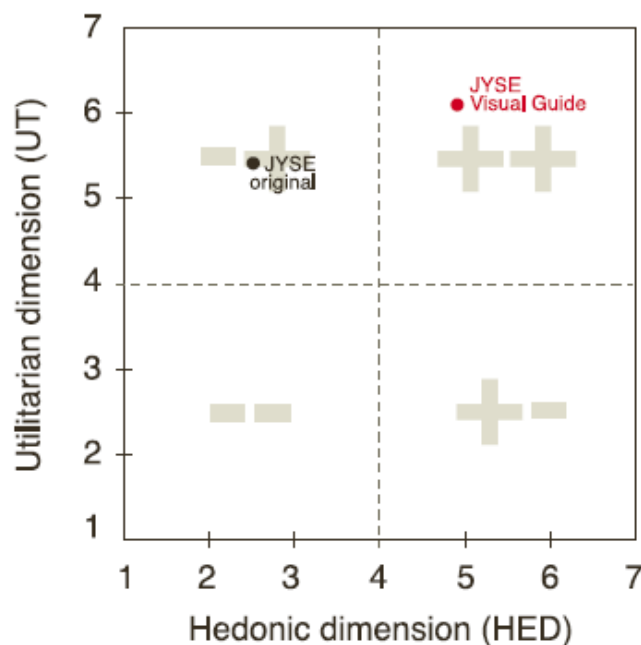


Figure 6: Perceived difficulty before and after use. Comparing the original JYSE vs. the JYSE Visual Guide

The differences between and across the pre-test results for both documents are not statistically significant; users had equivalent expectations of difficulty. However, we can see that while there is virtually no difference between pre-test and post-test values using the original JYSE, the post-test values achieved after using the JYSE Visual Guide are lower than the pre-test values, indicating that the experience of use was actually easier than expected.

Statistical significance was achieved by both the pre-test/post-test (“finding”) difference ( $t(23)= 2.41, p < 0.05$ ) and the pre-test/post-test (“understanding”) difference ( $t(23)= 3.55, p < 0.01$ ). This provided evidence for a consistent effect of visualization on the degree of post-test perceived difficulty and, thus, confirmed hypothesis H2. Summarizing, the results indicate that, while the users expected equal difficulty in using either version of JYSE, after usage the JYSE Visual Guide is perceived as less difficult than the original JYSE.

Last but not least, in terms of perceived usability, we will take into consideration the utilitarian dimension of the HED/UT scale, which is used to assess the opinion of the users on the degree of functionality and usefulness of the two documents. The original JYSE received, on average, an evaluation of 5.4 points, while the JYSE Visual Guide received 6 points (Figure 7). The difference between the two results is statistically significant, and was calculated with a Mann-Whitney U-test, because the variable is not continuous ( $U(24)=170, Z= 2.42, p < 0.05$ ). In conclusion, the results obtained from all the three measures of perceived usability provide support to hypothesis H1c. The participants perceived less difficulty in using the JYSE Visual Guide, and evaluated it more positively, in terms of functionality, than the original JYSE. This finding was confirmed during the focus group discussions, as participants described the Visual Guide as clear, useful and easy to use.



**Figure 7: Hedonic and Utilitarian characteristics. The original JYSE scores well in functionality, but not in pleasure of use. The JYSE Visual Guide excels in both dimensions.**

To conclude, we examine the differences of the two documents in terms of user experience. We now take into consideration the hedonic dimension of the HED/UT scale, which is used to assess the degree of affective, sensorial gratification perceived by the users interacting with

the document. The original JYSE received, in average, an evaluation of 2.8 points, while the JYSE Visual Guide received 4.7 points (Figure 7). The difference between the two results is statistically highly significant (Mann-Whitney test,  $U(24)=93$ ,  $Z= 4.01$ ,  $p < 0.01$ ), which indicates a clear emotional response towards the JYSE Visual Guide. This value, considered together with the score on the UT value presented above, places the JYSE Visual Guide in the top right hand quadrant of the HED/UT scale, which indicates an excellent product from both the perspectives of functionality and pleasure of use. This positive affective response is confirmed by the results obtained on the I PANAS SF scale. The JYSE Visual Guide determined a rise in the measure of positive affect (34.91 points vs. 30.33 points, on a scale ranging from 10 to 50), while causing a decrease in the measure of negative affect at the same time (15.58 points vs. 20.91), as illustrated in Figure 8. Statistical significance was found through a Mann-Whitney test for both the difference in positive affect ( $U(24)=186.5$ ,  $Z= 3.13$ ,  $p < 0.01$ ) and in negative affect ( $U(24)=135.5$ ,  $Z= 2.08$ ,  $p < 0.05$ ).

Summarizing, the results obtained from the two measures of user experience provide support to hypothesis H3. A more aesthetically pleasant and clear display of information had a positive effect on how the participants experienced the interaction with the JYSE Visual Guide. During the focus group discussion, participants expressed their enthusiasm for the Visual Guide, finding it interesting and wishing that also the JYSE 2009 SUPPLIES as well as some other general terms would be complemented with a visual guide.

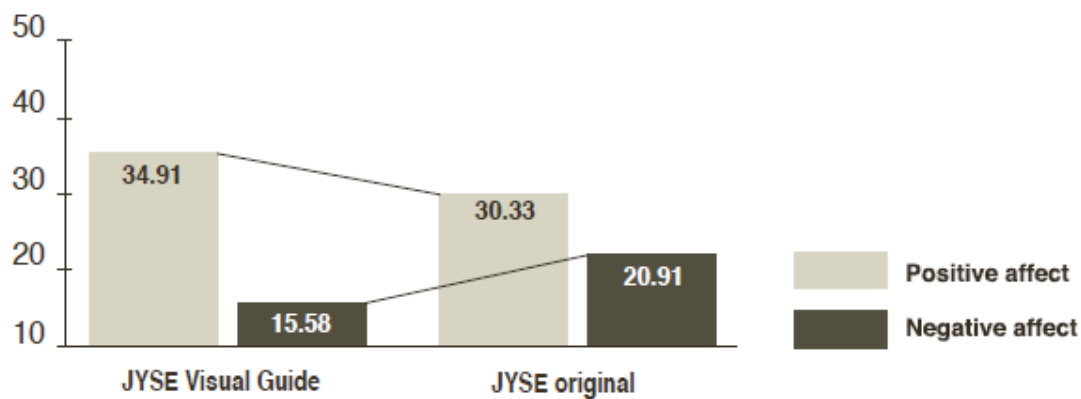


Figure 8: Positive and Negative Affect elicited by the using the two documents. Visualization causes an increase in positive affect and a decrease in negative affect.

## 7 Discussion and conclusions

The results of this experiment suggest that visualization can play an important role in enhancing the understanding of complex documents, such as contracts and general terms. Visualization helps to make sense of the content in ways that are not enabled by text alone: the links between causes and consequences, alternative courses of action, and processes are

made visible and given a structure that allows the user to easily shift between details and overview. According to Keller and Grimm (2005) such visible, explicit information structures diminish cognitive load and enhance cognition. This consequently leads to superior speed and accuracy in understanding (Kirsh, 2010), as confirmed by the results of our experiment. Even though the improvements in accuracy were not statistically significant, they have shown the same tendency to outperform the textual version of the document found by Passera (2012) in a similar experiment. In that case, the difference in accuracy between the visual and the textual versions of the contract was remarkable (60% correct answers in the textual version vs. 71.9% in the visual one). The visual and textual versions were equally unknown to the experiment participants.

Conversely, in the present experiment we compared a well-known document with a new, unfamiliar one, and we suspect that a “familiarity factor” – the ability to successfully use a familiar document in spite of its qualities – was at play. In making sense of the document, the textual version enabled the advantage of using long-term memory, in addition to cognitive processes based on visual short-term memory. It is thus remarkable that the visual version managed to produce comparable (if not slightly better) results, as respondents could only count on their own cognitive skills and the visual cues offered by the document itself.

These results have relevance to contracting practice, as visual contracts could help civil servants, especially the new or less expert ones, to understand the JYSE terms more quickly and accurately. This can lead to time saving in contracting and implementation, as the key people are able to make the right decision faster, while avoiding possibly costly errors. As the JYSE Visual Guide provides a visible, persistent referent (Kirsh, 2010), public organizations and their suppliers can communicate more easily. As visualizations clarify the JYSE terms, there is less space for misunderstandings and the parties come to share a common understanding of the rights and obligations defined in JYSE.

Visualization has a positive effect on user experience, as shown by our results. The Visual Guide not only works well, but also feels interesting and easy. It is important that contracts and terms are not perceived as difficult and threatening, as procurement professionals without a legal background need to be engaged with these documents in order to successfully procure high quality, suitable services for the citizens and avoid inefficiencies and shortcomings. Clear, simple terms for public procurement are also needed to attract small and medium size companies in entering into business with public organizations, and boost competitiveness. Currently, smaller companies might not have the capabilities or the willingness to participate in bidding, and this is a missed opportunity for private and public organizations alike: the former lose possible remunerative customers, while the latter often have to deal with a limited choice among possible suppliers.

Our study is, however, not free from limitations. Firstly, the results are drawn from a single experiment, and while it provides encouraging results, we need to consider them as indicative and preliminary. A series of similar experiments, carried out in different contexts and with different documents, could yield more robust and generalizable results. The



number of experimental subjects was too limited, and this also affects claims of generalizability to the whole population from which they were sampled – civil servants and procurement professionals in public organizations. While this sample size was suitable for the purpose of developing the Visual Guide in a rigorous and user-centered way, we require more subjects in order to make more general statistical inferences. In order to address this issue, we are planning to expand the experimental sample, involving people from other municipalities as well as representatives from suppliers and service providers. In this way, it will be possible not only to obtain more robust data, but to gain insights and feedback also from the sellers.

Summarizing, this study not only introduces a novel, visual approach to develop user-centered communication tools in public procurement, but also provides empirical evidence of the benefits of contract visualization. Such evidence should raise a question of the reasons for “verbocentricity” in contracts, which seems to be grounded in tradition and resistance to change, rather than in an actual proof of the superiority of textual, monomodal communication in expressing contractual information. From a Proactive Contracting perspective, solutions that support understanding, collaboration and knowledge sharing – such as visualization – should be prioritized, as they facilitate business interactions and prevent problems. The ultimate *raison d’être* of business contracts is not to serve legal interpretation purposes but to facilitate the reaching of business goals. As user-friendly communication tools contracts empower the parties to reach their goals, we have presented and tested a tool which seeks to take seriously the demands of the dialogical relation between parties and their working tools.

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