A Brief Evaluation of Icons in the First Reading of the European Parliament on COM (2012) 0011

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Abstract. We present the result of a small-scale test in which the participants failed to understand the graphic scheme as well as the pictographic parts of the icons appearing in the Annex to Article 13a of the European Parliament legislative resolution of 12 March 2014 on the Proposal for a regulation of the European Parliament and of the Council on the protection of individuals with regard to the processing of personal data and on the free movement of such data (General Data Protection Regulation), COM (2012) 0011.

Keywords: usable privacy, EU regulations, computer icons

1   Informed consent and UI objects that make a user understand privacy policies

The principle of "informed consent" as prescribed by national laws and EU directives [3] makes it necessary to inform users about all the intended data processing when they submit data. Conveying the sometimes highly complex clauses of privacy policies to the subjects concerned is generally hard. The solution of providing situated or "just-in-time" information to internet service users has been discussed and investigated in several projects and reports. At the same time, it is known that for psychological reasons it might be hard to divert a user's attention from the primary goals of a transaction to the details of privacy policies.

In order to solve the problem of these competing requirements, expandable short texts as well as icons have been proposed by different authors and project teams (see for instance the overview and discussions in [2], esp. Chapter 2 and section 5.5.2). This report takes a look at the icons appearing in Annex 1 to Article 13a of [5], which is a European Parliament document on a proposal [4] for new EU regulations.[1]

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[1] "Compromise amendements on Articles 1-29". COMP Article 1. 07.10.2013 [5]. Later adopted as the "European Parliament legislative resolution of 12 March 2014 on the Proposal for a regulation of the European Parliament and of the Council on the protection of individuals with regard to the processing of personal data and on the free movement of such data (General Data Protection Regulation)." COM (2012) 11. Brussels, 25.1.2012. [6]

The set of icons presented in the Annex raises some questions. Are these icons as suggestive of the content as intended? The proposal states that icons, texts (= verbal statements of "essential information"), and a kind of evaluation of whether or not the statements are met shall all be presented in a table. However, as experienced in several experiments, indications of deviations from desired conditions should be marked close to the corresponding fields for entering data or close to any OK or ACCEPT button rather than in a separate window or as a text that the user is likely to scroll away from in order to find the OK button. It is therefore of interest to see how a user would understand the icons in themselves, especially if understood as implied by Annex 1 so that they can be used in notifications and not only in the table (otherwise a user interface designer might end up having two sets of icons with similar meanings).

Furthermore, as the table presents evaluations which are made according to a desired policy, the composition of statements and evaluation symbols is of interest to investigate. (The statements stating the desired policy are called "essential information" in Annex 1.)

In order to assess the suitability of this graphic scheme as well as the pictographic parts of the icons, a minor survey was made with Media and Communication undergraduates to see how they comprehend the icons. Here we report on the thoughts behind the design of the survey and on the results that came out of it. The paper is structured as follows:

Section 2 presents the bulk of Annex 1.

Section 3 explains the rationale of the questionnaire used in the survey.

Section 4 summarizes the results of the survey.

Section 5, finally, presents some further thoughts on the composition of icons for information and alerts.

2 Article 13a and Annex 1 of the proposed amendments from 2013

The first page of Annex 1 is here reproduced in Fig. 1 together with Fig.2 showing two symbols a) and b) which are to be inserted in the right-hand column of the table. It is important to note that the table in Fig. 1 is not included in the official amendment text of 2014 [6]. This is probably just a mistake and accordingly we have to refer to the 2013 document [5].

The Annex thus presents a table which matches icons to "essential information" and then continues by explaining that the symbols a) and b) will be used in the third column if the conditions in the second column are met or not met, respectively. It is also stated specifically that the words in bold are supposed to be in bold.

As a side note, the information in the first three rows can be questioned. For instance, row 1: the demand of the regulation should rather be that *all* purposes are given than that certain data collections are marked as superfluous for the purposes given. Nevertheless, it can be argued that the sentences and the corresponding icons might be used in slightly modified versions for summaries before data disclosures or later in incident reports.

Fig. 1. First page of Annex 1 in [5]

Fig. 2. a) and b) are symbols presented on the second page of Annex 1.

3   Design of the questionnaire

In order to get an idea of whether people would have a fairly consensual comprehension of the table in Annex 1, especially its iconographic parts, a survey aimed at a university class was designed. More diverse respondent groups can of course be considered, but if the students of a university class have very divergent notions of the iconography presented, there is no reason to assume that a larger survey would suddenly reveal a coherent comprehension of it.

The presumption of the suggested reformulation of Article 13a is that a table can easily (meaningfully) be presented to a data subject "Where personal data relating to a data subject are collected". Probably, a table with icons, legends, and evaluation indicators (the two icons in Fig. 2) may give a good overview of the conditions for processing the data because different parts of the table can be related to each other. "We seek and use visual structure" as one user interface expert and psychologist puts it (Johnson [8], Chapter 3). The icons, for instance, can be constituted of symbols that seem quite arbitrary, as they will occur next to what is called "essential information". However, as remarked in section 1, always presenting a whole table may be problematic if the icons and texts are to be used in recurring or varied UI situations.

Thus, the first question in the questionnaire simply read: "Describe what you think the icons below are about. You can write one single word or 1-2 sentences." It was followed by the six symbols encircled by red in the same order as they are presented in the Annex 1 table.

The second question requested the respondents to match icons with the "essential information" as defined in Annex 1. The order of the icons remained the same while the texts were put in alphabetical order in relation to the main word (the bold face words). Naturally, as only six alternatives were available, a fairly high score on this question could be expected if respondents used a strategy of mutual exclusion. However, as the goal of this questionnaire was not primarily to see if a user can understand the full table, the instruction included an invitation to the respondent that, "If you think several icons match a text or that one icon would fit several of the texts, you just mark that." The idea was that it would be interesting to see if there were alternative interpretations of one and the same symbol (and vice versa).

Finally, a noteworthy aspect of the "essential information" is that the sentences are negatively phrased ("No …"). This might not be a problem in itself, but it means that the icons are intended to signal a negative statement. Thus the icons include the red circle found in traffic signs. However, a red circle with a diagonal bar is presumably more obvious in terms of indicating a negative statement. This is the first problem one can envisage: the proposed icons try to make a compositional statement with an un-

wanted condition in the middle and a red circle around it to signal, "It is not the case that…".

The situation is further complicated by the third column of the table, where an indicator is supposed to be inserted to signal whether or not the assertion of the composite statement will be fulfilled. The symbol a) in Figure 2 is presumably understood as affirmative, but the symbol b) in fact means that "It is not the case that the statement in the left and middle column will be fulfilled." Thus, for each row with a red cross, the message should be interpreted as: "It's not the case that it's not the case that…".

To see if people were prone to generate such interpretations, the third question was placed above a depicted sample row, and ran as follows: "When you are about to enter some personal data at a site, you notice the row below. What do you think the site is trying to say?"

The questionnaire can be found in a working paper with English translations [11]. Admittedly, there are points where the design of the study can be questioned. For instance, situating the icons (or the whole table) on actual web pages would have been fairer to the proposal. On the other hand, research projects such as PRIME, PrimeLife, and A4Cloud have made clear that there are functions which would provide similar information to data subjects but without the purpose of giving consent (cf. in particular the *Data Track* [12], [1], [2] section 5.3.1). A user interface designer should not end up having two sets of icons with similar meanings; thus, there are reasons to explore how generally understandable the icons in Figure 1 are. Likewise, there are reasons to investigate how understandable the doubling of negations is.

Pilot questionnaire: Before the questionnaire was handed out to the class, four people were asked to read the introduction and answer the questions. The pilot group of respondents comprised one administrator, two academic psychologists, and finally one student union representative. The introduction was slightly rephrased after the first pilot run of the test. Moreover it was obvious that the "necessary information" texts had to be given in Swedish (for instance, a word like *dissemination* was not understood by all pilot testers). The order of the texts was not rearranged when Swedish translations were inserted.

4　　Summary of the answers and some implications for UI design

The questionnaire was handed out to an undergraduate class in "Visual communication and design". Everyone was willing to participate, which provided 21 responses. The answers (translated into English) are given in [11].[2]

In question 1, only one respondent, #21, understood the red circle as some kind of negation. The question (translated into English) was: **Describe what you think the icons below are about. You can write one single word or 1-2 sentences.**

We present one example here. It is the 21 comments to the first icon in Figure 1. Notably, only respondent #21 starts his/her answer with a negative phrase, "not

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search…". In the list, alternative translations are given in parentheses. Multiple answers are given on separate lines.

#	Description(s) given
1.	search for people (people search)
	more info about the person
2.	Detailed information
3.	Examination (check, inspection)
4.	Search information about a person
5.	Examination of an individual
6.	Alert (warning) about surveillance
7.	Find a person
8.	Personal data
9.	Identification of person
10.	Inspection area
11.	This icon means that the page looks up personal data about you, the user
12.	Save data [personal data]
13.	In order to search person … ?
14.	Background information
	personal data
15.	?
16.	Person check
17.	Investigate
18.	Investigate deeper (closer)
19.	Check (examination) of personal data
20.	Searching for people (People search)
21.	not search on persons (not searching for people/individuals)

All in all, the interpretation deviated quite often from the concepts intended in Annex 1 of the proposal. Considering how many times the phrase "personal data" is used in the introduction, it is disappointing to see how few references to privacy policy issues are found in the answers. The Swedish term for personal data, *personuppgifter*, seems however to have influenced the wording in some answers as some respondents have used the Swedish non-technical term *uppgifter* rather than *data* or *information*, which in this case would be completely synonymous with *uppgifter*.

Question 2 "Try to match": Only one respondent made multiple matchings so a simple evaluation of the result is reached by counting the total number of correct matches for each respondent. On average, it was not very high:

Matches	6	5	4	3	2	1	0	
Number	4	1	3	6	5	1	1	= 21

A more thorough inspection of the answers, however, reveals that the translation of "are retained" to *bevaras* may have confused respondents, since the standard Swedish term for saving files in computer programs is *Spara* and this word is often associated with the floppy disk symbol. Choosing *Sparas* instead of *bevaras* in the questionnaire might have raised the number of all-corrects with some 25-50% per cents.[3]

The lesson to be drawn from this is that if icons are used that distinctly resemble well-known icons from other user interfaces, the wording in each language must match the standard "textual" translation of the icon. Thus, the intended message must be conveyed in the same words and also be close in meaning to the standard use of the icon + word.

In question 3, icon number three gets a definitive interpretation because the icon and the "essential information" are put together just as in the table in the Annex of the amendments. This of course influenced the respondents and it explains why the answers actually deviate from the explanations provided by the respondents in relation to the same icon in question 1. What is interesting is instead that in spite of the "essential information" provided in the table row, many respondents extended the meaning to cover also the forwarding of data. Four examples are included here:

#	Description(s) given
1.	Personal info is not shared with third party
2.	Info will not be furthered to other parties, will not be used
3.	The information is not shared with others.
4.	One will not share the [personal] data

Moreover, as the icon and the textual statement were combined with the red cross-out icon (Fig. 2b), the meaning should be interpreted as "It is not the case that the statement is valid." However, from the four samples just quoted, and all other answers, it is obvious that the system of negation of negation presupposed by the table semantics does not work. Perhaps equally telling is the fact that respondent #21 (like two others) left no comments to this question. One can of course not draw any definitive conclusion from only one case, but it is highly suggestive that the only respondent that seemed to have grasped the negation indicated by the red circle gave up when it came to the double negation of red circle plus red cross-out.

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[3] It is to be noted that the Swedish Personal Data Act from 1998 [10] hardly uses any word for passively storing data: *lagring* and *lagra* ('store') occur 1+3=4 times, but otherwise *behandla* ('to process') is used while the person is called 'the registered person'. The words for collecting, registering, organizing, and storing are used in the same sentence in the initial definition of *behandling*, 'processing', which seems to differentiate between registering and storing, but the differentiation is not drawn upon as all concepts are collected under 'to process'.

5 Some further thoughts on future UI design

For the future, the different needs of different user interface designs should be considered. For instance, icons do not have to make statements but rather only indicate area; this is appropriate when an icon is only used to open a table or dialog box which outlines the conditions of the particular data request made by that particular service provider. The icon then has a classifying function (a headline function). In order to call the data subject's attention to a specific and potentially problematic fact, a classifying icon can get a warning triangle superscript. The composition can still function as a place to click or hover over when one wants to read more.

There might be other alerts a user wants to receive than the ones prescribed by an EU directive. Therefore, customer-tailored integration of alerts must be considered.

Additionally, the information texts do not cover all the information that could be conceived as pertinent for cloud processing. The "essential information" may need to be extended and then icons or parts of icons may need to be reused.

Now let us turn to the ecology of the icons. It has already been mentioned above that situating the icons from the amendments in a web-based scenario might have increased their correct interpretation. Even if the reported survey was argued to provide meaningful data in spite of this, it is worthwhile to bring up the issue of situational interpretation for a final discussion to illuminate pitfalls and promises.

We will refer to two experiments conducted within the A4Cloud project ([7], chapter 3). In one of them, a paper-based mockup was used to see how test subjects would respond to a set of icons. The mockup was used to demonstrate a hotel booking scenario.[4] In a post-questionnaire, there were two icons to express the portability and non-portability of personal data to the data subject when he/she terminates a service contract. Graphical designers had provided us with icons that suggested a portfolio in the shape of a case. A few participants in the experiment interpreted this icon as signaling something to do with travelling, e.g. "OK to bring luggage" and "No help with the luggage". Hardly the kind of interpretations we had anticipated in a set of privacy policy icons, but of course, in a specific scenario centered on hotel booking this was not too far-fetched. To create effective privacy tools for the future, one must consider the possibility that, initially, people who are presented with a set of icons may believe that the icons are event-specific rather than general and that such a belief may lead to misunderstandings. (These responses also illuminate why general functional categories for icons, such as for instance the ones recently presented by Jakob Nielsen [9], do not offer any a priori help in design work: the correct applications of a category are not obvious until after user testing.)

The other experiment was a survey of the same kind as the one reported here. To illuminate the effect that the situation can have on the apprehension of the same set of icons, it is interesting to contrast responses in this survey to responses to a similar questionnaire in the mockup-based scenario mentioned in the last paragraph: one question displayed alternative symbols for the area where EU regulations are applicable. A simple EU symbol (blue with the letters "EU" encircled by yellow stars) might

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[4] Credits to Henrik Andersson for producing the mockup and collecting the data.

be questioned as there are some non-EU countries that also follow EU regulations. As the questionnaire explained: "Some states outside the EU also follow EU regulations. Together with EU they form EEA – The European Economic Area (EU + Iceland, Lichtenstein and Norway)." The respondents in both questionnaires were asked "What symbol would you prefer is used to show that data processing takes place inside EEA?" The icons they could choose among were the three depicted in Fig. 3. In all three cases, the icon legends read "DATA PROCESSED INSIDE THE EUROPEAN ECONOMIC AREA".[5]

The survey respondents, who had no other priming to this set of icons than the explanation that EAA is not identical with EU, all voted for one of the EEA icons except for three persons as Fig. 3 shows ($N = 49$). On the other hand, in the small mockup-based evaluation of icons ($N = 10$), the respondents had in the mockup seen the ordinary EU logo indicating data processing within the countries regimented by EU regulations. The scenario would have been less casual if there had been prior discussions of the political extension of supranational regulations why we had avoided to use any of the two EEA icons. This conditioning seems to have had a strong influence on the answers as nearly all respondents in this test preferred the common EU logo despite the icon legend matching the EEA explanation in the question.

	Questionnaire the only priming	EU symbol priming in mockup
EEA (chevron icon) DATA PROCESSED INSIDE EUROPEAN ECONOMIC AREA	13 "avoid confusion with EU"	1
EEA (stars icon) DATA PROCESSED INSIDE EUROPEAN ECONOMIC AREA	33 "an inspired combination of a well-known symbol and a new content"	1
EU (stars icon) DATA PROCESSED INSIDE EUROPEAN ECONOMIC AREA	3	8 "easier to understand"

Fig. 3. Acceptance of new symbols with typical arguments from respondents.

These results show how volatile results can be, how much they depend on the design of the investigation (and this problem cannot be remedied by means of a larger number of respondents; the proportions might be the same more or less for the same priming factor). At the same time, there is also the promise that if standardized information policies are designed with due consideration of the "total" user interfaces of web sites and specific privacy tools, and vice versa, then correct understanding may

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[5] Credits to Jessica Edlom and Mia Toresson for the icons. Credits to Elisabeth Wennö and Anna Linzie for a professional language check of the entire document.

be facilitated far beyond what an individual icon or icon legend can manage. Another implication should also be stressed; in relation to user testing, namely, that such contextual features should be reported so that workable UI solutions are presented with information on the contextual background – we are tempted to say *enabling* background.

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