Coding Process

First cycle:

Pre-processing: Treatment of the raw data consisting of reading all the answers and sorting out the incomprehensible ones.

1st phase: Read the answers and try to make sense of them. In this phase, the most significant parts of the answer (in respect with the research questions) were highlighted.

2nd phase: Assign InVivo codes for each answer. These codes are a way to synthesize the idea expressed in the answer, using parts of the answer itself.

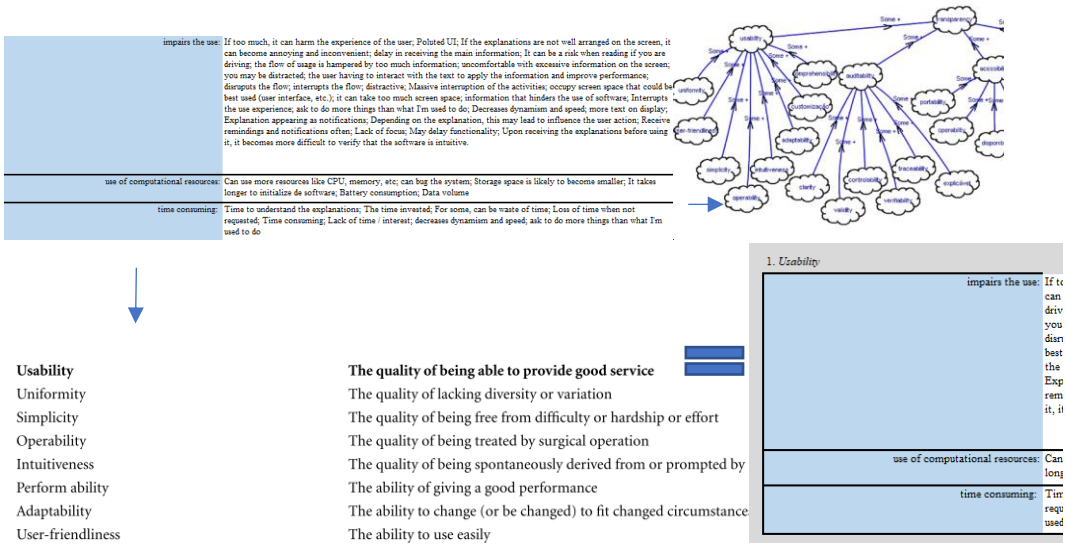
3rd phase: Assign a temporary label for the InVivo codes. Examples of temporary labels:

difficulty (in the eyes of practitioners)evaluating th
unnecessary information, user already knows
time
repetitive explanations
too much information, can harm the experience
time consuming
time consuming
confusing
none
None
inconvenience
use of resources
time consuming
annoying to the user
insecurity when knowing what is being used

Second cycle:

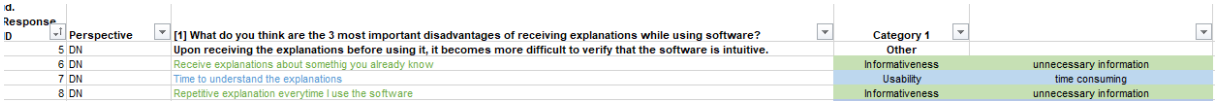
1st phase: Similarities between codes were analyzed. Codes that were perceived to be similar, expressing the same ideas were assembled together, with support of the temporary labels. (Meta-code phase)

2nd phase: The meaning of the grouped codes was analyzed, to develop the “final category”. This category is like a theme created from the grouped codes. This is a process of reflection. A second researcher was involved during this phase to discuss if the grouping made sense and the possible meanings. They also discussed whether the categories belonged to an NFR in the Transparency SIG.



Usability	**The quality of being able to provide good service**
Uniformity	The quality of lacking diversity or variation
Simplicity	The quality of being free from difficulty or hardship or effort
Operability	The quality of being treated by surgical operation
Intuitiveness	The quality of being spontaneously derived from or prompted by
Perform ability	The ability of giving a good performance
Adaptability	The ability to change (or be changed) to fit changed circumstance
User-friendliness	The ability to use easily

3rd phase: The two researchers coded the unlabeled answers into the final categories.



Response ID	Perspective	[1] What do you think are the 3 most important disadvantages of receiving explanations while using software?	Category 1	
5	DN	Upon receiving the explanations before using it, it becomes more difficult to verify that the software is intuitive.	Other	
6	DN	Receive explanations about somethig you already know	Informativeness	unnecessary information
7	DN	Time to understand the explanations	Usability	time consuming
8	DN	Repetitive explanation everytime I use the software	Informativeness	unnecessary information

Excel File:

Each row represents the response(s) of one participant. The response has an id, which is in Column A. Column B contains to which group the answer corresponds to: DN represents an answer of a Digital Native and DI represents an answer of a Digital Immigrant.

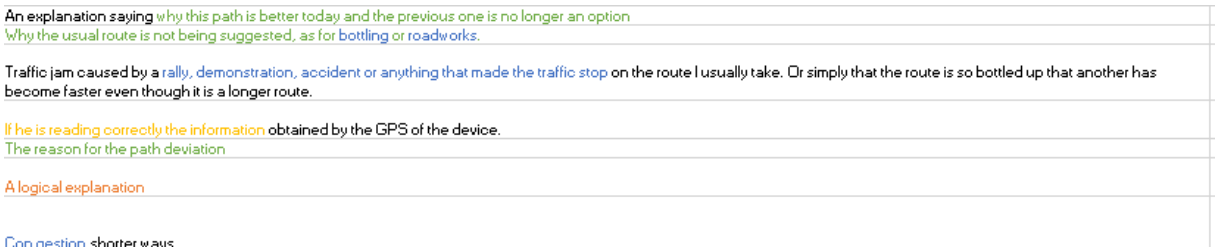
is used to signalize that coding does not apply, either because the answer does not fit to none of the codes or the coders could not understand or extract the intended meaning.

Table "Problems – Data "

Column C: The software where the problem was found.

Column D: The question and Column E/F: the category and subcategory it belongs to. The codes were elaborated based on the Transparency SIG.

Table "Helpful Explanation – Data"



An explanation saying why this path is better today and the previous one is no longer an option
Why the usual route is not being suggested, as for bottling or roadworks.

Traffic jam caused by a rally, demonstration, accident or anything that made the traffic stop on the route I usually take. Or simply that the route is so bottled up that another has become faster even though it is a longer route.

If he is reading correctly the information obtained by the GPS of the device.
The reason for the path deviation

A logical explanation

Congestion shorter ways

The InVivo coding is shown highlighted on the sentences, with the color corresponding to the category it belongs.

Category 0 is part of 3rd phase of the 1st cycle of the coding process and consists of an earlier kind of code.

Category 1, 2 and 3 are the categories. Category 2 and 3 are additional categories, if the answer contains double meaning or could belong to two categories.

Quality of Explanation – user as an additional column to evaluate impressions about expected qualities.

Sentiment – used as an additional column to evaluate impressions related to the feelings user expressed, while referring to explanations.

Table "HelpfulExplanation – Codes"

Codes are grouped into categories. Categories are divided into groups, if they are related.

Categories have its own colors to facilitate identification during the coding process.

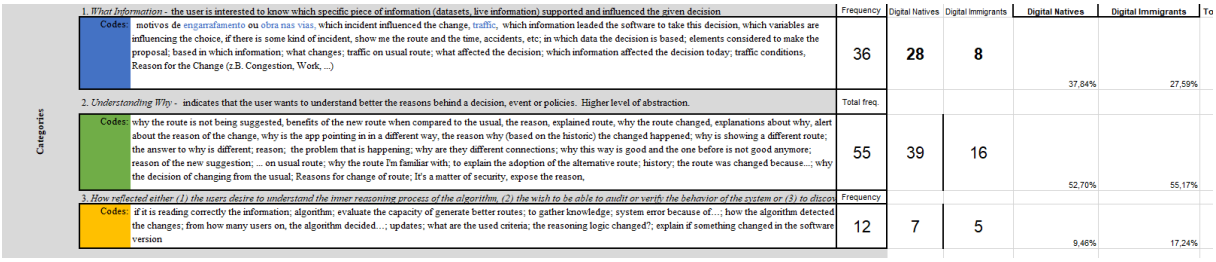
Examples of groups in this table: (Main), Sentiment, Quality of Explanation

Groups Sentiment and Quality of Explanation were created to support the understanding of the problem but were not included in the evaluation.

Example of categories in the main group: What Information, Understanding Why, How

Each category has a brief description about it. Examples of the InVivo codes are presented.

The frequency of codes related to the category is presented, as well as the codes referent to answers of DN and DI. The relative values are also presented.



Categories			Frequency	Digital Natives	Digital Immigrants	Digital Natives	Digital Immigrants	To
	1. *What Information* - the user is interested to know which specific piece of information (datasets, live information) supported and influenced the given decision							
	Codes:	motivos de engarrafamento ou obra nas vias, which incident influenced the change, traffic, which information leaded the software to take this decision, which variables are influencing the choice, if there is some kind of incident, show me the route and the time, accidents, etc; in which data the decision is based; elements considered to make the proposal; based in which information; what changes; traffic on usual route; what affected the decision; which information affected the decision today; traffic conditions, Reason for the Change (z.B. Congestion, Work, ...)	36	28	8	37,84%	27,59%	
	2. *Understanding Why* - indicates that the user wants to understand better the reasons behind a decision, event or policies. Higher level of abstraction.		Total freq.					
	Codes:	why the route is not being suggested, benefits of the new route when compared to the usual, the reason, explained route, why the route changed, explanations about why, alert about the reason of the change, why is the app pointing in in a different way, the reason why (based on the historic) the changed happened; why is showing a different route; the answer to why is different; reason; the problem that is happening; why are they different connections; why this way is good and the one before is not good anymore; reason of the new suggestion; ... on usual route; why the route I'm familiar with; to explain the adoption of the alternative route; history; the route was changed because...; why the decision of changing from the usual; Reasons for change of route; It's a matter of security, expose the reason,	55	39	16	52,70%	55,17%	
	3. *How reflected either (1) the users desire to understand the inner reasoning process of the algorithm, (2) the wish to be able to audit or verify the behavior of the system or (3) to discov*		Frequency					
	Codes:	if it is reading correctly the information; algorithm; evaluate the capacity of generate better routes; to gather knowledge; system error because of...; how the algorithm detected the changes; from how many users on, the algorithm decided...; updates; what are the used criteria; the reasoning logic changed?; explain if something changed in the software version	12	7	5	9,46%	17,24%	

Tables "Advantages – Data" and "Disadvantages – Data"

The InVivo coding is shown highlighted on the sentences, with the color corresponding to the category it belongs.

Category 0 is part of 3rd phase of the 1st cycle of the coding process and consists of an earlier kind of code.

Category 1 is part of the 2nd cycle of the coding process and represents the pattern code. Category 2 represents an additional category, if the answer contains double meaning or could belong to two categories

Tables "Advantages – Codes" and "Disadvantages – Codes"

Codes are grouped into categories. Categories are grouped bottom-up, with a category and a sub category.

Categories have its own colors to facilitate identification during the coding process.

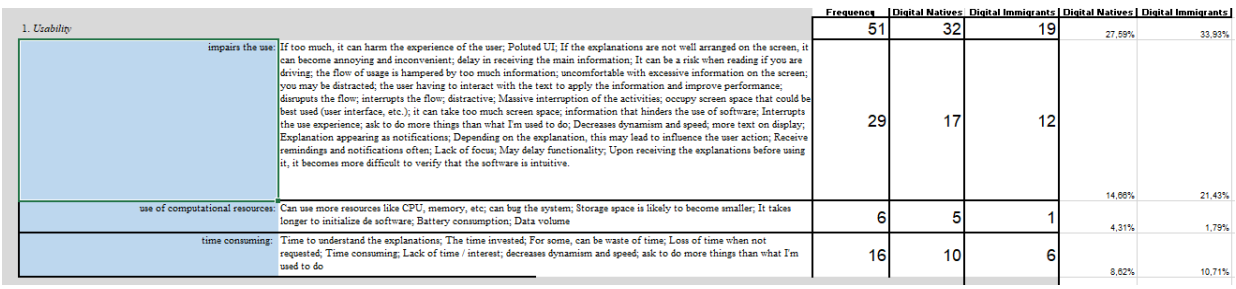
Categories in Advantages: Usability, Informativeness, Auditability/Verifiability, Relationship with Software

Each category has a brief description about it. Examples of the InVivo codes are presented.

In the upper row of each group, the frequencies of codes belonging to the group are presented, also divided according to DN and DI.

The frequency of codes related to each category is presented, as well as the codes referent to answers of DN and DI.

The relative values are also presented.



		Frequency	Digital Natives	Digital Immigrants	Digital Natives	Digital Immigrants
1. *Usability*		51	32	19	27,59%	33,93%
impairs the use:	If too much, it can harm the experience of the user; Poluted UI; If the explanations are not well arranged on the screen, it can become annoying and inconvenient; delay in receiving the main information; It can be a risk when reading if you are driving; the flow of usage is hampered by too much information; uncomfortable with excessive information on the screen; you may be distracted; the user having to interact with the text to apply the information and improve performance; disrupts the flow; interrupts the flow; distractive; Massive interruption of the activities; occupy screen space that could be best used (user interface, etc.); it can take too much screen space; information that hinders the use of software; Interrupts the use experience; ask to do more things than what I'm used to do; Decreases dynamism and speed; more text on display; Explanation appearing as notifications; Depending on the explanation, this may lead to influence the user action; Receive remindings and notifications often; Lack of focus; May delay functionality; Upon receiving the explanations before using it, it becomes more difficult to verify that the software is intuitive.	29	17	12	14,66%	21,43%
use of computational resources:	Can use more resources like CPU, memory, etc; can bug the system; Storage space is likely to become smaller; It takes longer to initialize de software; Battery consumption; Data volume	6	5	1	4,31%	1,79%
time consuming:	Time to understand the explanations; The time invested; For some, can be waste of time; Loss of time when not requested; Time consuming; Lack of time / interest; decreases dynamism and speed; ask to do more things than what I'm used to do	16	10	6	8,62%	10,71%

Example of Usability and its subcategories: impairs the use, use of computational resources and time consuming.

51 is the total of codes belonging to the category usability. From these 51, 32 are the codes related to the answers of Digital Natives and 19 are the codes related to the answers of Digital Immigrants.

For further questions related to the coding process, feel free to contact the authors.