



Trends Research ENabler for Design Specifications



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Authors	C. BOUCHARD, L. SOURBE, C. MOUGENOT
Approved by	A. AOUSSAT
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SPECIFICATION VALIDATION RESULTS

Workpackage 1 – Task 1.5

This document shows end-users' validation towards the functional specifications for the TRENDS system.

Acronym	TRENDS
List of participants	LCPI SERAM PERTIMM INRIA ROBOTIKER CRF (FIAT) STILÉ BERTONE UNIVERSITY OF LEEDS UNIVERSITY OF CARDIFF
Coordinator organization	LCPI SERAM : Laboratoire Conception de Produits et Innovation, SOCIETE D'ETUDES ET DE RECHERCHES DE L'ECOLE NATIONALE SUPERIEURE D'ARTS ET METIERS
E-mail contact person	carole.bouchard@paris.ensam.fr
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1. OBJECTIVES

1.1 GENERAL CONTEXT: TRENDS PROJECT WP1

TRENDS project first work-package (WP1) consisted in an “END-USER NEEDS ANALYSIS”, which means specifying and validating end-users needs for the future TRENDS system and software.

End-users count among the relevant concerned industrial actors, ‘Centro Ricerche FIAT’ and ‘Stile Bertone’, as Marketing, Design and Innovation. It was proved by previous studies that designers by car builders and by car manufacturers use the same information. Information about their needs was completed by additional information on existing systems in industry and research areas. From these input data, a functional analysis was done in order to find out functional specifications as input data for the following work package. The validation of the first interface elements will be done with a specific sample including the end users of the TRENDS consortium and additional designers working by other companies and by car manufacturers.

WP1 objectives are the following:

- To define the user needs, and the methodology of interviewing, benchmarking, etc.
- To make a world wide state of the art and a benchmarking data base on design information systems.
- To define functional specifications for the TRENDS system.
- To validate result data with end users.

Needs analysis was based on recent methods in ergonomics as ethnographic approach. The collaborative work between partners essentially lies in the interviews first, then in a functional analysis. Functional analysis was supported by teamwork meeting between the partners.

1.2 FUNCTIONAL SPECIFICATION OBJECTIVES

The work package was structured in two main phases. WP1 first phase included the three initial parallel subtasks:

- T1.1. Interviews with the end-users: designers, engineers, marketing people at CRF and at SB.
- T1.2. Worldwide state of the art on design and innovation information systems
- T1.3. Benchmarking with innovation, design and R&D departments.

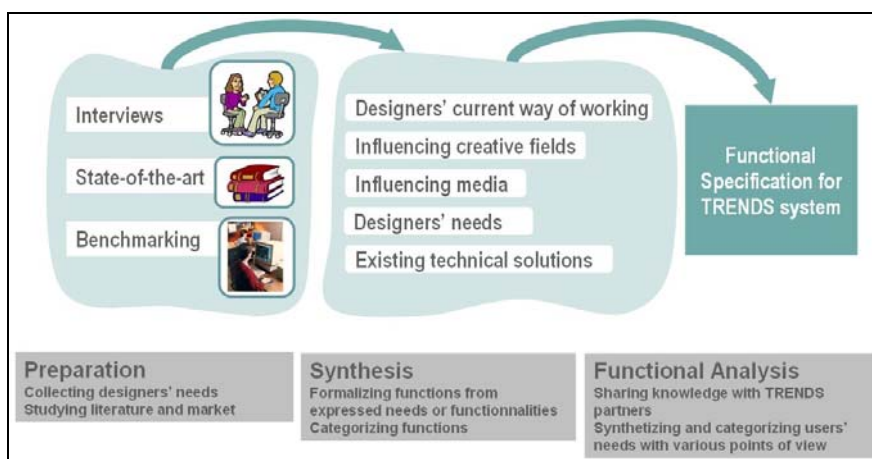


Fig. 1 : TRENDS Project “Workpackage 1” Activities

The “functional specification” phase used the previous results as input data for the formalization of a **functional analysis** (T1.4) in which WP1 partners participated. It was a collective task allowing a mix of various points of view over the TRENDS system.

The functional analysis consisted in:

- structuring end-users needs
- defining the future software goals, the software external environment, its life cycle
- expressing the main functions to be offered, the constraint functions and criteria linked to these functions

The functional analysis was provided with interviews synthesis, giving birth to the list of users needs specifications: users specifications expressed under the form of a verbal list are provided, with a current situation diagnosis about specific problems and needs identification, as well as an ideal vision of the future in terms of information system linked to the trends analysis, idea generation and design activities.

1.3 CONTENTS OF THE REPORT

This report is related to the task T1.5. It aims at setting out validation results expressed by the end-users after an initial validation of the function list by the TRENDS partners.

The first part is dedicated to the protocol used for the questionnaire. This questionnaire included three levels of detail. The results were obtained with about twenty end-users. After its refining and reduction by LCPI, the whole list of functions was ranked by the end-users according to the importance of each quoted function for them.

The second part details the results and the operational conclusions. In fact the previous ranking will be used in order to prioritize the different functions. Besides it will be helpful for preparing the first creativity session, which aims to propose the first graphical interfaces for TRENDS-system.

1.4 TASK SCHEDULE

If we consider the whole task schedule of the first work package WP1 (see figure 4), we can see that the deliverable D1.5 is the last one. It corresponds to the overall validation task for the complete work package. This validation includes both points of view: the end-users one and the TRENDS system designers and developers one. These two visions are complementary and essential because the end-users are not always able to imagine new functionalities that could fulfill their needs, and the system developers can't imagine the problems the end-users can or could encounter in their activity currently or when using the future TRENDS system in an exhaustive way.

2. PROTOCOL

2.1 FUNCTIONAL ANALYSIS

Previous deliverables D1.1, D1.2 and D1.3 presented the outputs from the interviews with TRENDS-system end-users, from the state-of-the-art of research on tools close to TRENDS-system and from a market study about existing tools close to TRENDS-system.

Those deliverables provided us with a list of around 200 items that were taken out of the reports by the design researchers. A functional analysis protocol was carried out, in order to structure the needs and to formalize the functional requirements for the TRENDS-system, based on end-users needs. We ended up with a list of main functions and additional functions to be found in the TRENDS-system.

In the functional analysis task (cf. D1.4 deliverable), TRENDS-system developers participated by giving their view in terms of technical capabilities.

2.2 QUESTIONNAIRE ELABORATION

Starting with the list of functions that was built through the functional analysis session, we came up with a reduced 124-item questionnaire, divided into five parts; the functional proposals covered issues (cf. figure 2) that were raised in the interviews, such as:

- interaction
- search
- use
- store
- resources

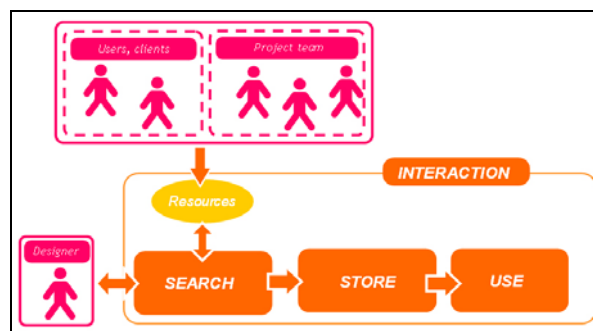


Fig. 3: Design process as a guideline for needs-ranking questionnaire

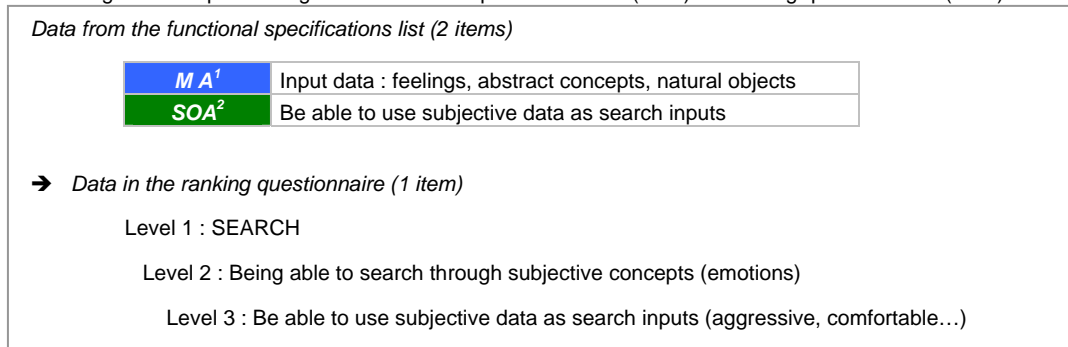
In each of these five categories, questions were grouped in sub-categories; therefore we had 3 different levels in the questionnaire as shown in table 1.

Tab. 1 :Questionnaire level description

<i>Levels Description</i>	<i>Example</i>
Level 1 – Design process categories	“SEARCH”
Level 2 – Functional subcategories	“Searching not only with text as input data”
Level 3 – Functionality	“Possible input data: sketches”

If they covered similar issues, some of the functions coming from the functional analysis were grouped into a single question, as shown in figure 3. This operation helped to reduce the questionnaire length; this ensures a better rate of replies among the end-users who received the questionnaire. The questions were translated in end-users language. Indeed some functions coming from the state of the art or from benchmarking were more proposed by computer scientists and are not, in this sense, easy to understand by the end-users.

Fig. 4: Items processing from "functional specification list" (D1.4) to "ranking questionnaire" (D1.5)



2.3 FUNCTIONAL ANALYSIS VALIDATION

As a final step for functional analysis (cf. figure 3), end-users were involved again in the functional description of TRENDS-system, since they had to rank the functional requirements according to their major expectations towards TRENDS-system.

In this purpose, a questionnaire (cf. Annex : "Needs Ranking – Interactive Questionnaire Grid to End-users") was e-mailed to each end-user who participated to the interviews, i.e. 32 individuals.

20 of the latter sent back a completed questionnaire to us, with the following repartition:

- 15 designers
- 2 design project managers
- 3 R&D collaborators

End-users had to evaluate functional proposals for TRENDS-system on a 5-level scale, from "1 not important" to "5 essential". The raw results are shown in the following paragraph (cf. 3.1 End-users' Feedback).

Functional requirements ranking by end-users is shown as a validation for the functional specification and described in the following report.

¹ Market analysis (D1.3 output)

² State-of-the-art (D1.2 output)

3. RESULTS

3.1 END-USERS' FEEDBACK

We put together all replies to the questionnaire in one single table (cf. table 2). The answerer's profile was notified with the letters "d" (design department), "rd" (R&D department) and "pm" (project management).

Every answer was coded with a number corresponding to the chosen level in the scale from "not important" (which is coded by "1") to "essential (which is coded by "5).

For each question-item, several average values were computed

- the average value related to the designers' answers
- the average value related to the design-project managers' answers
- the average value related to the R&D people's answers
- the overall average value, related to all twenty answering end-users

All participants answered to level³-3 question, while only designers answered to level-2 question, probably due to communication troubles with respect to the questionnaire instructions.

³ For explanations about questionnaire levels, please refer to table 1.

3.2 DISCUSSION

The first statistics study show that the average values representing the answers by the end-users are all above the average value between “not important” and “essential”, which means that, in average, all end-users found that the items proposed in the questionnaire were useful. This is due to the fact that the proposed items were partly coming from the previous end-users’ needs analysis (interviews).

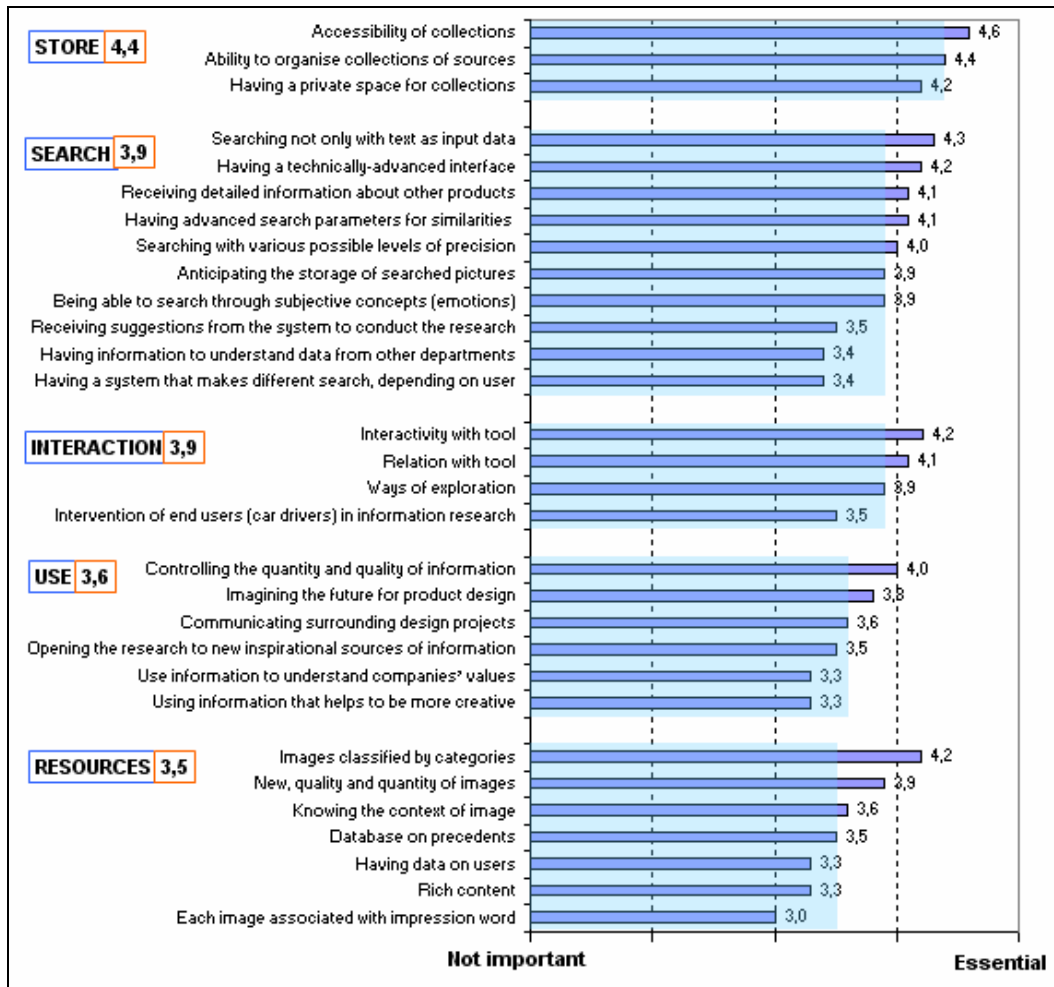


Fig. 5 : Designers' Feedback (panel : 10 individuals)

- The statistical results allow visualizing the items ranking at the various questionnaire levels⁴.
 - The level-1 ranking made by the designers shows the following order (by decreasing order of importance): “store”, “search”, “interaction”, “use”, “resources”.
 - At the level-2, in the “store” category for instance, we notice that the “accessibility of the collections” (of data, pictures..) was ranked as the most important item, with a 4.6-value average (on the 5-level scale)
 - In the future development of TRENDS-software, this need should be taken into account by the developers, in making a clear interface and a clear usage protocol.

⁴ For explanations about questionnaire levels, please refer to table 1.

- As another example, in the “store” category, we notice that the “accessibility of the collections” is ranked higher than the capability of “having a private space for collections”
 - *Clear interface and clear collections usage protocol should be a priority over the development of a private area for collection storage.*
- This ranking table also enables to visualize the various points of view among the end-users, depending on their professional background.
 - For instance, in the “Knowing the context of image” category, designers and project managers have different needs, since designers rated 3.9 the “Giving contextual information on sources (origin, specialty, authors...)” proposal, while project manager rated it 1.5.
 - *If some functionality for “giving contextual information on sources” is developed in the TRENDS - system, then it will mainly address designers’ needs (at first).*
 - But sometimes, needs are common for all skills: in “Relation with tool” category, designers, project managers and R&D people all have a very similar point of view about “Increasing the speed of search”. This item was respectively rated 4.5, 5 and 4.7.
 - *The speed efficiency of the future TRENDS-tool should be w priority for the developers, since it was rated very high by all professional skills.*
- This ranking also allows for withdrawing the least-ranked questionnaire items from the list, in order to keep only the most essential needs, for which solutions will be developed in TRENDS system.
- Considering in detail the *interaction*, the designers aspire distinctively to an attractive display of information where feeling words could be combined with objective information. Conviviality is a high valued requirement for all types of end-users and more specifically the speed of search has to be high. The active control of information parameter is of high value as well, especially for decision makers.
- In view of the *use*, the designers favor functions like controlling the quantity and quality of information with a large visualization potential, browsing in various sectors and databases, translating market language into design language. All other functions seem to be very important for them to a lower extent: it is rare to find quotations under 3. It is just the case for two items, linked to sharing points of view between departments and communicating about inspiration sources.
- Taking the *search* into account, it is important for the designers to be able to combine vague or focused search at the same time, and to have the possibility to use a similarity based search. The search should be based on several data like images, sketches on top of words. The search has to be very quick and very picture oriented with functions like identifying, controlling, and categorizing.
- The *storing* function is of great importance, especially for the designers. Most of the time the quotation is beyond 4 on the evaluation scale. For them *storing* means to have both private and shared spaces for a flexible collection being possibly implemented everywhere and at every time. They would like to be able to organize and categorize information in flexible categories, with different structures like by-project or by sectors.
- The expected *resources* of the future TRENDS system include mainly images classified by categories in many sectors and meta-information. Rather than a huge quantity of data, designers look forward recent and high quality images coming from various sectors. It could be surprising that designers did not assign the highest value to the necessity to link the images with impression words. Indeed this item was considered as a big challenge of the TRENDS project.

In fact even if designers constantly use impression words and emotions in order to characterize images, this work is their own business and it is often done very intuitively. For that reason we tend towards the elaboration of a learning system for the future TRENDS system, being able to learn rules expressed directly by the designers.

It is necessary to propose a great database on precedents, showing related information on specific brands. User data and contextual data are expected as well.

4. CONCLUSION

The ranking questionnaire made possible to get end-users evaluation about functional proposals that were listed in the "Functional Specifications List" (D1.4 deliverable). Thus, functional specifications were ranked from "not important" to "essential". We can then reduce the list of functionalities that will be developed in TRENDS-system, by keeping only the needs of most importance.

The ranking questionnaire allowed the evaluation of end-users needs from various professional backgrounds (designers, project managers and R&D people). Clear differences in the needs depending on the profile were observed.

Designers put emphasis on visualization, quality and freshness of information, mainly under the form of images in various sectors. The most important function they expect is storing. In fact they are limited by their own memory in their usual activity. The storing function could help them to find and retrieve adequate information.

The designers stated two specific needs involving antinomial constraints: they would like to *store* information everywhere and at every time. This function could be fulfill on a PDA or any other mobile storing device. But then they want to visualize high quality images with high resolution, which is more appropriate on big screens.

People from R&D focus more on the need of a certain variety of information, the possibility to control the search, the link between occupations and the necessity to integrate consumer and user related information. In this way, they emphasize more the collaborative aspects of the design activity.

The project managers are more interested in decisional aspects, and less on operational functions.

The ranking presented in this report will be used for the preparation of the creativity sessions where the interface solutions will be proposed.

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6. GLOSSARY

DESIGNERS

“Designers” are designers of TRENDS-system to be developed, i.e. European project partners.

END-USERS

“End-users” are end-users of TRENDS-system to be developed, i.e. people from design-related skills, coming from such departments as design, marketing or innovation.

FUNCTION

In design science, a function corresponds to the need to fulfill through the product. It is directly linked to the service to ensure and is enounced in terms of finality: “the new system has to enable to : ...”.

FUNCTIONAL CRITERIA

The functional criteria aim to characterize each identified function with a targeted quantitative interval where the system has to be positioned. Sometimes it is not possible to quantify the criteria of the system and it is useful to go through a qualitative description.