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# Tools for an Augmented Design: quantitative virtual show&tell

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## ABSTRACT

In this paper we describe a variant of the "show and tell" method designed to be used in collaborative design processes. We will show that it works as a qualitative and, as well, as a quantitative aid to the design process, especially, but not exclusively, in the analysis phase. Thanks to it, indeed, it is possible to identify with a small effort, as emerging features, those critical characteristics of a given domain that may require an appropriate design action. We show also that this method, in its quantitative variant, gains further pedagogical value because it compels the students to operate a mediation aimed to achieving a shared outlook, starting from the realization of existing differences in the perception of a specific design's domain (due to different mental models). The method finds its use also in entirely or partially online design processes. In fact, we show and briefly discuss the results obtained by applying the method to different educational design contexts within an on line open source educational environment, LIFE. Finally we show how it would be possible to optimize the use of the proposes method, by means of a specific application that we start to develop as an internal module of the LIFE environment, as part of a project that aimed to develop an online collaborative design lab.

## Categories and Subject description

H.5 INFORMATION INTERFACES AND PRESENTATION. H.5.2 [**User Interfaces**]; H.5.m [**Miscellaneous**]; K.3.1 [**Computer and Information Science Education**]: Distance learning; K.3.2 [**Computer and Information Science Education**]: Computer science education, Information systems education.

## General Terms

Design, Experimentation

## Keywords

Show&tell, design process, problem setting, analysis' activity augmented learning, interaction design, design place, learning, design

## 1. INTRODUCTION

In design processes the analysis, or the problem setting and re-setting phase - both limited in time or part of a layer that goes along with the whole process [1] - is one of the most delicate, because the correct startup and the smooth development of the project itself depend on this phase.

During this activity, it is capital to explore the design's domain at best, especially when you're dealing with projects in which, even if you have located a specific goal and/or target and/or place, you still don't have design specifications. This is just the case of most of the Interaction and Experience Design projects, in which the context is complex and you have to answer not much focused questions like: how to make a visit to a museum more attractive with interactive technologies? How to make the elderly quality of life better with interactive technologies? And so on.

The place and its unsolved related problems - problems that will be described in the following phase of the process by scenarios, personas' profiles and so on - can be analysed by means of very different methods. We can split them into two big sub classes: on-field ethnographic observations [2] (in which we also include searching for and collecting tangible clues, like those leading to the production of certain mood boards [3] or worksheets [4]) and collection of "encouraged" informations. In this latter, the stimulus used to get the answers can leave more or less "free hand" to subjects: indeed, you may use very "open" stimulus like cultural probes [5-6] for example, or very focused stimulus like multiple answers questionnaire.

On one hand, the on-field observations tend, with some exceptions, to provide mostly with qualitative informations; on the other hand, questionnaires tend to schedule and limit one's choices field, although their organization are wide ranging. The borderline case is embodied by multiple-choice questionnaire that can be mapped onto a rigid n-dimensional space, in which the results can fill only and exclusively one of the positions grid of a pre-defined space of representation. Similar limitations can be encountered with all the methods based on a matrix or a grid representation of the collected data, like for example the repertory grid technique [7]. In this latter, as an example, the interviewers have a further degree of freedom - they can assign a quantitative value to a specific box of the grid - but the grid, that is the space of representation, and investigation is, anyway, usually pre-defined and closed. A further problem that one may encounter in using questionnaire, and similaria, is sometimes due to the amount of occurrences required to get statistically relevant results.

It would be desirable, then, to locate methods that could: a) give the person free hand in choosing; b) give reasonably remarkable results with a small effort both from the interviewer and the interviewed; c) provide with quantitative results. It would be also desirable that these methods were suitable for being embedded into processes in which the collaborative activities play the most

part, such as design processes handled by students, and particularly online.

Trying to meet these requirements in the past we worked on the quantitative analysis of conceptual maps [8], more recently we focused on a variant of the "show&tell" [9-10] model, in which we tried to minimize the amount of information required to the interviewed subjects (whom often were the students themselves), and maximize the benefit of collaborative analysis practices.

In the next pages, we'll first describe the virtual "show&tell" method as it has been used up until now; then we'll describe how it works on practice, providing for examples of results from its application in the field of entirely or partially online design processes. Finally, we'll briefly outline the features of the developed application program and the context it was conceived for, as well as its future development prospects.

## 2. THE VIRTUAL SHOW&TELL METHOD

In its earliest formulation, the method, used as an aid in the analysis of a specific domain or place, prescribed that students would be asked to select six items - three of which with positive value and three with negative value - that could contribute to characterize a specific domain or place, or a certain aspect of it (i.e. artifacts, places, actors, services....). In a slightly different version, students would be asked to illustrate their choice with at least one image, so that the representation could be more meaningful and enthralling (see fig.1). The choice of the six items had to be completed in any case with a brief description directed to allow the extrapolation of a set of key words (concepts/motivations and attributes) that could be used later in the data representation. Once gathered the rough material and after having examined it accurately and critically, an expert kept elaborating a representation based on selected keywords, identifying a possible set of axis, the extremes of which expressing the highest level of certain opposite qualities (i.e. functional/objective - emotional, traditional - technological, social - private, etc…) and plotting the data on a 2D plane identified by two of those axis (see figures 2-4). The resulted data representation would be then presented again to students, who were asked out to start an open critical discussion about it and suggest possible modifications.

By using this earliest formulation of the method (see next paragraph) you could get highly significant domain representations, from which you can point out either positive or negative aspects that could be used as helpful aids to the building of scenarios, and more in general to the whole design process. All the above indications can be worked out with very little waste of time for everybody (except for the tutor, whose working load is, in any case, bearable). It is interesting to notice that in this earliest formulation of the method, the representation space it is not at all pre-defined, even though it doesn't emerge univocally from the collected data. Its outcropping, indeed, is strongly suggested by the moderator tutor/designer.

After having run the method several times we identified a set of representation axis that seemed to be relevant for most of design domains. According to this findings we worked out a different version of the method, aiming to a) emphasize the spontaneous outcropping of meaningful areas; b) make the methodology more quantitative-like.

In this second version the students are asked again to identify three items with negative and positive value regarding a certain domain/place, or just a specific aspects of them. Again they are asked to complete their task by adding one images per item and a brief explanation of their choices. In addition, however, the students are also asked to assign to each item one or more numerical values in order to identify the position that such item has to take in the space of representation. In the last example discussed in the next paragraph, for example, the students were asked to assign three value to each item in order to locate it the space of representation identified by the axis functional-emotional, social-personal and physical-abstract. The predefinition of the axis corresponds, obviously, to the choice of one of the possible subspace of representation, and that is the price one has to pay to make the method more quantitative-like.


**Fig. 1 - Snapshoot from a Virtual Show&Tell's session**

Once collected, the data are firstly represented without any mediation. Such a representation allows for interesting observations on the emergence of different mental models of the same domain. Afterwards, however, one goes on to discuss and to analyze critically such a representation in order to work out in a collaborative manner a shared perspective. This open discussion, usually, turns out to be very useful also to locate possible prejudices or particularly innovative points of view (both characterized by data located far from the mean). At the end of the discussion, one of the students and/or the tutor have/has to assume the responsibility of mediating and elaborating a final representation, as close as a shared vision could be. Such a vision, along with the representation gained from the previous phase, is a very helpful aid for the next phases of the design process, in particular to the one devoted to verify the correspondence between the problem setting and the answers provided by the design intervention. In the next paragraph we shall discuss some examples of application of the methodology just described.

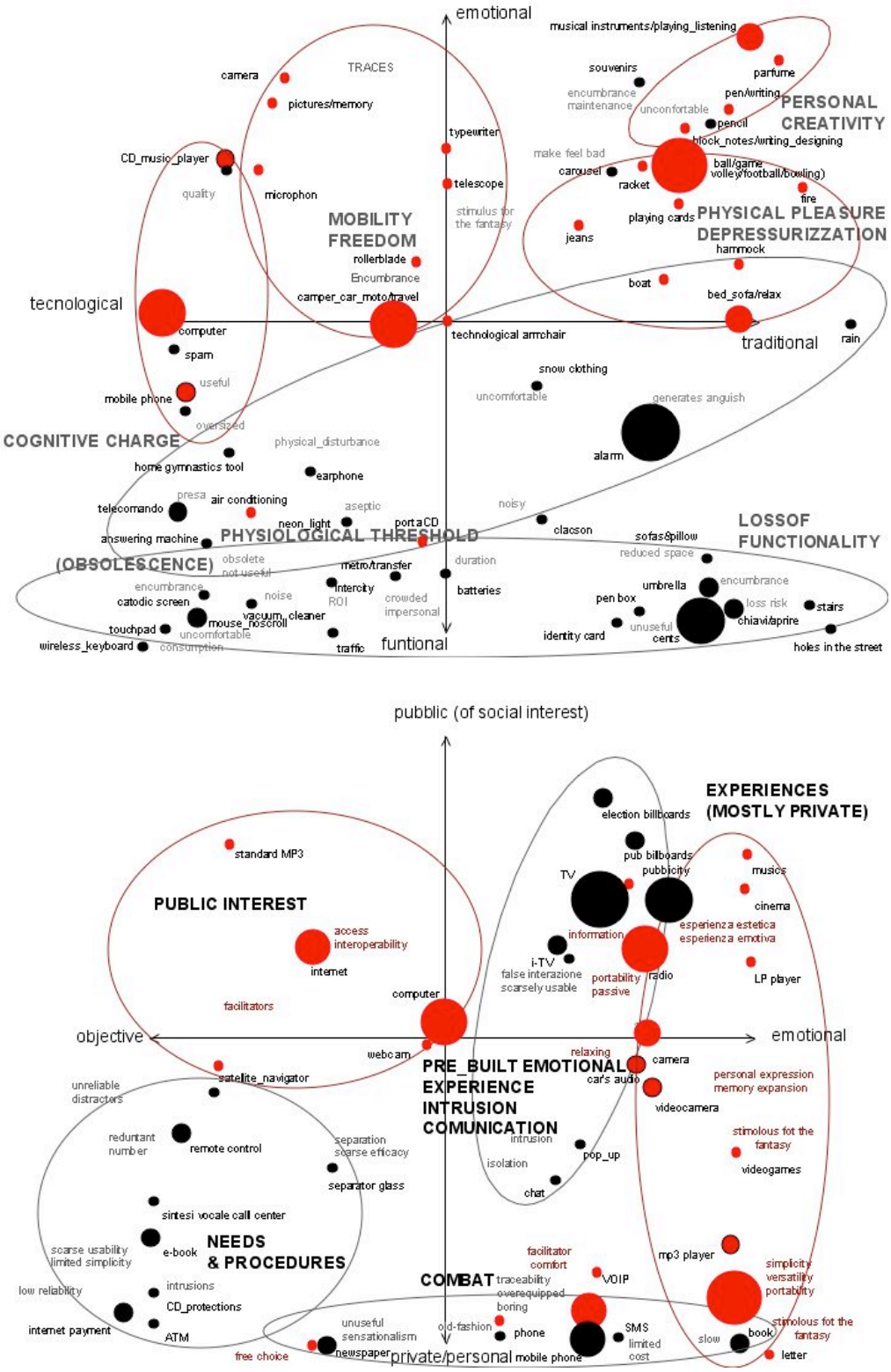


**Fig. 2 Data representations from the Show&Tell's sessions realized within the ISM course of the bachelor degree in Media Science of the University of Rome Tor Vergata (n.b. the dimension of the dots increases with the number of occurrences)**

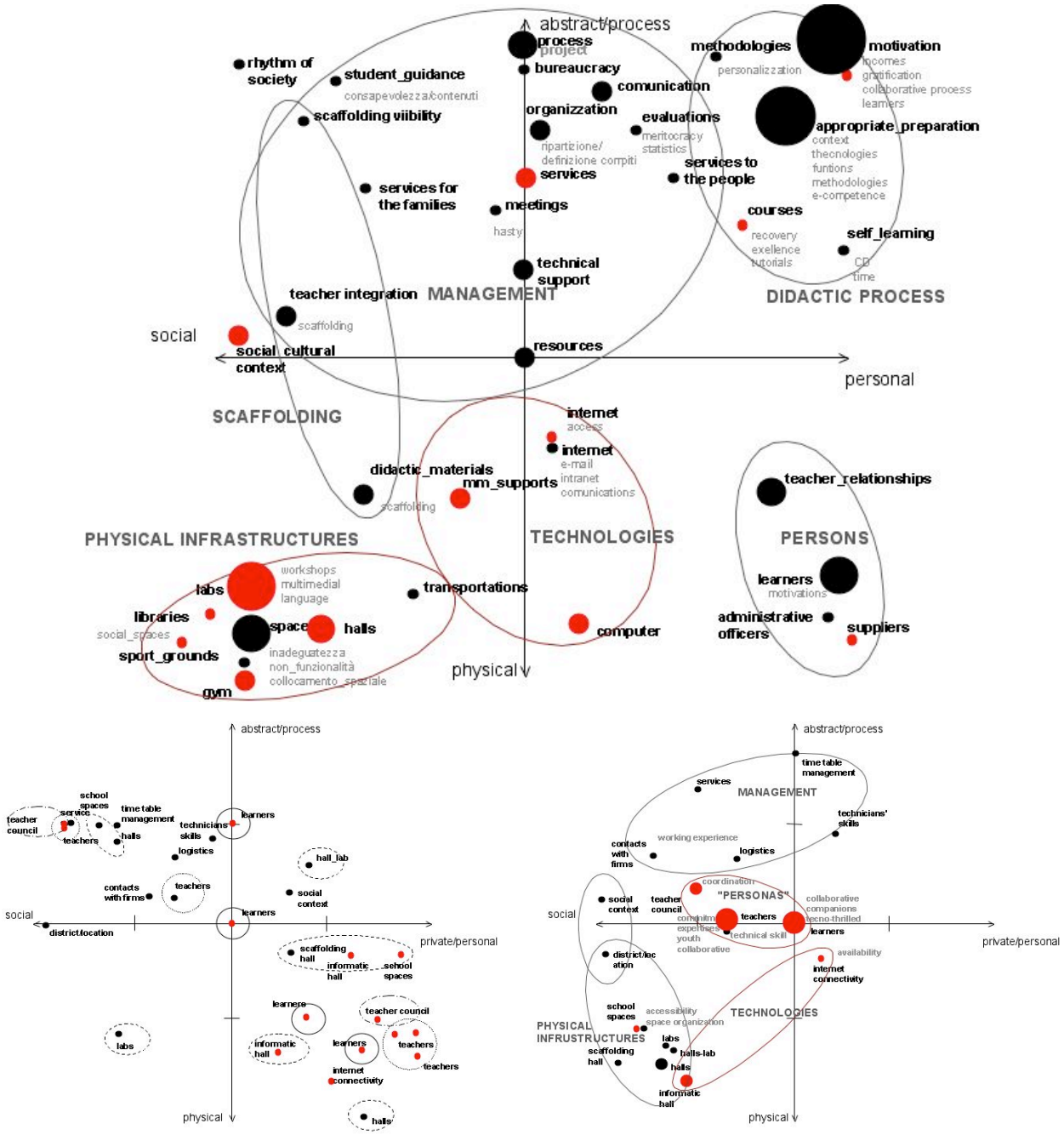


**Fig. 3 - Data representations from the Show&Tell's sessions realized within the Master in E-Learning at the ScuolaIaD of the University of Rome Tor Vergata.**

## 3. THE METHODS AT WORK

The cases that will be discussed in this paragraph just serve as examples of the potential of the method.

The first group of examples is referred to some of the exercises held during the Interface and Multimedia System course (ISM) within the Media Science degree of the University of Rome-Tor Vergata during the academic year 2005-2006. The ISM course is held during the third and last year of the bachelor degree. These exercises were aimed to explore, in a collaborative way, the perception of the youths with respect to the technology and the technological augmented artifacts, along with the expectations resulting from technological progress. We used the earliest formulation of the method, the one in which the axis of representation were not defined a priori. Almost 40 students have been firstly asked to indicate, justifying their choice online within a thread of the LIFE's forum, three beloved technological items and three hated ones. The graphics obtained after the mediation by the tutor, who time by time selected the axis of

representation, are reported in fig. 2.

From the first of these graphics, where the representation plan has been defined by the axis technological/traditional and functional/emotional, results that present generation regards as extremely positive (red dots) all the artifacts that allow emotionally and aesthetically enthralling experiences, both in a personal as in a social way (that is with social interaction). A positive attitude towards technologies and artifacts of public use has also been observed, although less evident. Instead, completely negative (black colored dots) is the outcome of the perception towards everything that can start an intrusive and/or a fake communication, even though apparently allowing dense interaction. The same negative perception results from artifacts considered functional to carry out procedures, which have to be computed unnaturally or "almost-naturally", even though considered necessary. Finally, the perception towards traditional communication systems is uncertain (i.e. mobile phone), even if they are strongly evolving.

From the second graphic dedicated to technological artifacts (artifacts that are also clearly present in the first image, indicating how important they are in everyday life), in which the representation plan has been defined by the axis objective/emotional and private-personal/public, results that emotivity and personal satisfaction are the leading elements in all the successful projects. They should aim to stimulate a distressing physical pleasure and personal creativity, and serve as an aid in freedom of movement and as a memory support. Being under the impression of a strong cognitional burden or physical inconvenience or the impression that the artifact will become quickly obsolescent and/or it will be wasting its functions; are negative perceptions that have to be avoided while design artifacts conceived for the considered target.

The second example refers to exercises held by some classes participating a Master online about e-learning during the academic year 2006. In these exercises students, mostly high school teachers, were guided to design in a collaborative way educational processes where technologies played an enhancing role on both the learning place and the processes. In this case, the show&tell method was used by the students to explore the initial perception of their own learning place of origin, places located all around the national territory.

The method has been used in its initial version with the first student cohort (fig. 3a), and in its readapted quantitative version with the second student cohort (fig. 3b e 3c). In this latter case the axis of representation that have been used were those that outcropped as significant ones during the exercises held with the first student's cohort

Generally speaking, from the first graphic of fig. 3 one can outline how the first cohort identified strong criticism in the design and in the management of the educational processes traditionally held in junior high school and high school. The perception of the quality of social relationships established on a personal level among the actors in the just mentioned places is also negative. The perception associated with the physical spaces and the infrastructure appears to be heterogeneous. On the other hand, there seems to be a reasonable trust in the ability of the technologies to improve the situation and solve some of the problems. It follows that school could be a fertile ground for interaction designers, even though, as well known by everyone, it is "unfavorable" economically.

The second graphic of fig. 3b shows the results that comes out from one of the first examples of use of the quantitative version of the "show&tell" method. The first evident result is that the data representation, as expected, derives from an overlapping of different mental models. The differences among the different positions taken by similar elements are outlined in the plot by the use of the same kind of dashed line. Starting from this situation the group had to build a shared representation. The tutor's intervention, subsequently discussed by the students, lead to such a representation, that shows features similar to those of fig. 3a, but also some differences: still negative is the perception towards the process management; even more negative than fig. 3a is the perception towards the physical infrastructures; more positive, though, is the perception towards people, but such an improvement determines a shift from the personal dimension to a more social dimension; the attitude towards new technologies still remains positive. By examining data more accurately one could obtain more and more detailed information useful for the design process, but this overcomes the aim of this paper.

The third and last example refers to an exercise held recently, at the end of 2007, at the K3 University of Malmo together with the students of the Master in Interaction Design, as a part of one of the didactic modules forecasted by the Master itself. Students were asked to plan a technologically augmented artifact able to improve the user experience of a specific place: a meeting place/club in which it is possible to watch a show, to visit exhibitions, to eat, to dance, etc… Also for this exercise the updated version of the method was used, and students were asked to locate the position of the chosen items on the following axis: functional-emotional, social-personal and physical-abstract. Here due to the lack of space we show only 2D graphics using the following axis of representation: functional-emotional and social-personal. The first of these graphics, obtained before the mediation by the tutor, once again outlined the more or less prominent presence of discrepancies among the mental models of the place, fig. 4a. After the mediation held by the supervisor the overview has become more exact and emerged that (see fig. 4b) the considered place leads to an unpleasant perception caused by a certain number of elements able to provoke "physical and psychological uneasiness", from standing in the queue, noise, untruthful information, etc…. Nevertheless, one can point out to its potential in being a " spatial socializer aggregate", even if the chosen way for such a socialization would be seen as strongly negative as producing an opposite effect. Positive without any doubts is the ability of the place to create personal pleasant experiences from an aesthetic/emotive point of view and partly cognitive.

In conclusion, it is worthy to notice that the method, as it has been explained, has been used during recent educational experiences, in the academic year 2006-2007, also to investigate more limited aspects of a place (artifacts, services, physical spaces, etc…) as in studying different virtual and physical places. However the space we have at our disposition doesn't allows for further discussions.

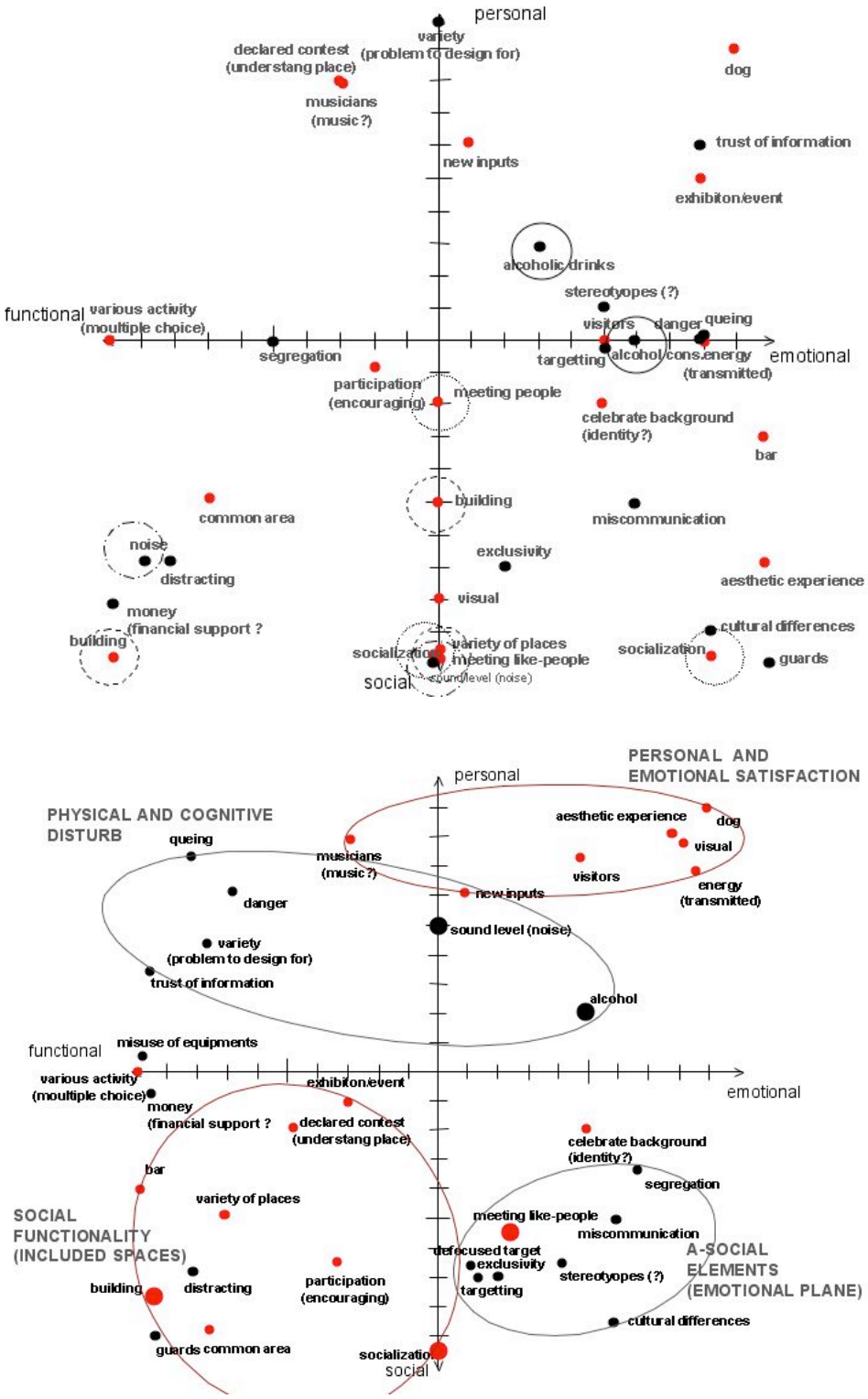


**Fig. 4 - Data representations from the Show&Tell's session realized within the Master in Interaction Design at the K3 of the Malmö University**

## 4. THE ON-LINE APPLICATION PROGRAM

Although the method illustrated in this article can be put in practice with the help of paper and pen and/or with help of a telecommunication forum and programs that offer simple drawing instruments, it's quite clear that the working time could be decidedly reduced and the method become more efficient if one could use a proper application that allows to insert quickly into a data base the chosen elements, the short justification of the choice, the key words that can identify certain elements, the coordinates of the elements in the chosen spaces of representation and, if necessary, the suggestion of the new and more pertinent axis of representation.

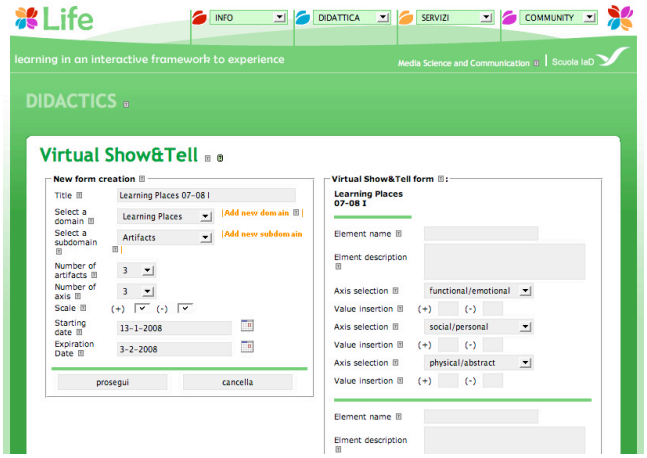


**Fig. 5 - Front page of the Virtual Show&Tell application embedded in the LIFE environment: the teacher's administration page**

By working this way, in fact, one can spare to the moderator teacher or student the whole burden of analysis and classification of the input produced by students on paper or within online forum and allow for the easy working out - in real time during the collaborative computer-assisted sessions if necessary - of the mediation, during which the numeric values/positions assigned to the selected items are expected to be participatedly redefined.

This is just what it has been done, see fig. 5. Indeed we have designed and developed a virtual show&tell application, as a first module of what in future should be a collaborative space/workshop for online design. Such an application will be used since the spring of 2008 and it has been developed as a part of a wider development project of an open source online educational environment, LIFE (Learning in an Interactive Framework to Experience), inspired by the constructivist methodology, by integration with social network analysis, by the experience itself of learning and by the development of an empathic interaction between a person and a machine [11-12].

## 5. CONCLUSION

The experience so far accomplished, and reported in this paper, shows that it is still possible to imagine new methodologies able to make design processes, and especially those carried out in the educational field, more effective by using collaborative approaches.

In this case, it has been shown how, by re-editing the "show&tell" method, one can obtain rich and detailed descriptions with small effort. We have discussed here only the emergence of certain macro-elements, for reasons of space.

It has been also shown how the method can be used with different issues and within different design processes. Moreover it has been show that it can easily be put on practice even on-line. In particular this fact should encourage a deeper investigation about the opportunity of integrating online and in presence educational scenarios, not very common in the interaction design field.

Along this line of investigation we have also presented an application that allows shrinking the time needed to accomplish most of the steps required to apply the virtual "show&tell" method.

Among the future directions this work can go:

- the investigation and introduction of more appropriate data representations

- the use of the methodology by means of wireless devices in order to encourage the use of the method also during on-situ observations, also in a collaborative way

- the comparison and integration with other quantitative methods like for example the repertory grid technique.

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