Individual and End-User Application of the EPMcreate Creativity Enhancement Technique to Website Requirements Elicitation

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Abstract

This paper describes a case study involving individuals from two distinct kinds of end-user stakeholders of a tourism Web site whose results support a conclusion that the EPMcreate creativity enhancement technique is effective when used by individuals, as opposed to groups, and when used by end-user stakeholders, as opposed to requirements analysts.

1. Introduction

Many have observed the importance of creativity in requirements engineering, e.g., [1]–[3]. Many techniques, e.g., brainstorming [4], Six Thinking Hats [5], and the Creative Pause Technique [6], have been developed to help people be more creative. Some of these techniques have been applied to requirements engineering [2], [7], and some of these techniques have also been subjected to experimental validation of their effectiveness [7], [8]. A fuller discussion of these techniques can be found elsewhere [9].

The authors of this paper, working alone or with others, have published a number of papers about one such creativity enhancement technique (CET), *EPMcreate (EPM Creative Requirements Engineering [A] TEchnique)* [9], [10], that is based on the *Elementary Pragmatic Model (EPM)* [11] and on a general-purpose CET developed to increase individual creativity [12].

One of these published papers [9] describes the EPMcreate technique and reports on an experimental evaluation of the technique's feasibility and effectiveness by experiments on two projects with very different characteristics. Each experiment compared the performances of two analysis teams, one of which used EPMcreate and the other of which used brainstorming.

Feasibility had to be investigated because EPMcreate was a new technique, which was operationalized from a general-purpose CET [12] to be applied to requirements elicitations. In particular, it had been necessary to define both the input of a creativity session with EPMcreate and the process. The main inputs of a session are:

- the problem statement or any other information useful for the computer-based system (CBS) to be developed, and
- a sound interpretation of the subjects' positions as defined by the EPM.

The definition of the process describes the steps and the activities to be performed at each step.

Effectiveness was chosen as the first research question: Is EPMcreate at least as effective as brainstorming? Brainstorming was chosen as the basis for a comparative measure of effectiveness, because: (1) it is well known [1], [13]; and (2) there are at least two studies of its application in requirements elicitation [7], [14], one experimental and the other anecdotal.

The results of the first experiments confirmed that, in at least the situations of the experiments, EPMcreate:

1) can be used by analysts, both junior and senior, requiring only minimal training and
2) produces more ideas and, in particular more innovative, ideas than does brainstorming.

Another of our previous papers [10] compared the quality of the ideas produced by the two treatments in these same experiments and concluded that EPMcreate produced more ideas related to content and service requirements than did brainstorming.

The first experiments exposed a number of issues to be explored in the future. These include:

1) Can an individual use EPMcreate as well as a group does?
2) Can a domain-expert, end user use EPMcreate as well as a system analyst does?

The purpose of this paper is to take up these two questions. The way of answering these questions is by controlled experiments that directly test these issues in the context of eliciting requirements for a promotional Web site, http://www.fiemmeskijazz.com/, that for the annual FiemmeSkiJazz Festival held in the Dolomite Mountains North of Trento, Italy.

In the rest of this paper, Section 2 describes the EPMcreate technique. Section 3 describes the exper-

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iments, including hypotheses and threats. Section 4 gives the results of the experiments. Section 5 determines if the hypotheses are supported, and Section 6 concludes the paper.

2. The EPMcreate Technique

The brief description of EPMcreate in this section is intended to be enought to allow reading of this paper. However, many background details and explanations that are found elsewhere [9] are left out in the interest of brevity.

EPMcreate, as a creativity provoking technique, helps a requirements elicitor (REl) to generate *all possible* reactions to two stakeholders' positions. These reactions can be captured by the 16 Boolean functions of two variables, named fi for $0 \leq i \leq 15$; fi names the function for which i is the decimal numeral corresponding to the 4-digit binary numeral, $R_1R_2R_3R_4$, obtained from the reaction column of a table for the function. Some representative function names and their corresponding tables, where "Pn" means "Stakeholder n's Position" and "R" means "$R_1R_2R_3R_4$", are:

$f0$

$P1$	$P2$	R
0	0	0
0	1	0
1	0	0
1	1	0

$f3$

$P1$	$P2$	R
0	0	0
0	1	0
1	0	1
1	1	1

$f5$

$P1$	$P2$	R
0	0	0
0	1	1
1	0	0
1	1	1

$f10$

$P1$	$P2$	R
0	0	1
0	1	0
1	0	1
1	1	0

$f15$

$P1$	$P2$	R
0	0	1
0	1	1
1	0	1
1	1	1

Each function can be considered as representing one pattern of reaction to the stakeholders' two positions. For example:

- $f0$ represents disagreeing with everything, independently of any stakeholder's position.
- $f3$ represents agreeing with $S1$ completely.
- $f5$ represents agreeing with $S2$ completely.
- $f10$ represents disagreeing with $S2$ completely, independently of $S1$'s position
- $f15$ represents agreeing with everything, independently of any stakeholder's position.

Thus, each of the 16 Boolean functions represents one method of combining two stakeholders' viewpoints to generate yet another viewpoint from which creative ideas can flow. If there be more than two stakeholders, the technique can be applied several times, for each relevant pair of stakeholders, up to $\binom{n}{2}$ times for n stakeholders.

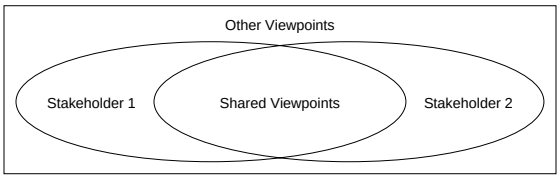

Figure 1. Venn Diagram of Two Stakeholders' Viewpoints

2.1. EPMcreate in Practice

EPMcreate can be applied in any situation in which ideas need to be generated, e.g., at any time that one might apply a CET, such as brainstorming. EPMcreate is by no means the only technique for identifying requirements; it is but one of many that can be used.

When a REl determines that EPMcreate is an appropriate technique during requirements engineering for a CBS under consideration, she first chooses two kinds of stakeholders, SH1 and SH2, usually users of the CBS, as those whose viewpoints will be used to drive the application of EPMcreate. She may ask the CBS's analysts for assistance in this choice. She then convenes a group of these analysts. See Figure 1 for a diagram that the REl will show the chosen stakeholders as part of her explanation. In this diagram, the two ellipses represent two different stakeholders' viewpoints. Thus, for example, the intersection region represents the stakeholders' shared viewpoints.

The REl tells all convened,

> Today, we are going to generate requirement ideas in 16 idea generation steps. In each step, all of you will pretend to think from the viewpoint of two stakeholders, SH1 and SH2, and for each viewpoint.
>
> - In Step 0, you will blank out your minds.
> - In Step 1, you will try to come up with ideas for problem solutions that are needed by both SH1 and SH2.
> - In Step 2, you will try to come up with ideas for problem solutions that are needed by SH1 but not by SH2.
> - In Step 3, you will try to come up with ideas for problem solutions that are needed by SH1 without concern as to whether they are needed by SH2.
>
> ...
>
> - In Step 15, you will try to come up with ideas for problem solutions without concern as to whether they are needed by either SH1 or SH2.

In the event that the REl believes that more than two stakeholders' viewpoints should be considered, she will convene more EPMcreate sessions, one for each pair of stakeholder viewpoints she believes to be useful. Her experience tells her how to identify subsets of stakeholders and stakeholder pairings that will yield the most new ideas for the fewest pairs.

3. The Experiment

This paper describes an experiment that was designed to address the two questions raised in the Introduction. The starting hypotheses were:

- H1 The EPMcreate technique can be applied for requirements elicitation by an individual, as opposed to a group.
- H2 The EPMcreate technique can be applied for requirements elicitation by a domain-expert end user.

The first hypothesis is important both because each creativity technique is often classified as either an individual or a group technique and because the feasibility of EPMcreate as a group technique has already been demonstrated [9]. Being able to use EPMcreate as an individual technique would help reduce the costs of using EPMcreate to identify requirements. In any case, there is evidence that brainstorming is usable by individuals and that an individual application of brainstorming is at least as effective as a group application of the same [15].

The second hypothesis is important because best practices in requirements engineering suggest end-user involvement in the requirements processes, including elicitation [1], [16].

3.1. Design of the Experiment

Designing an experiment to check the hypotheses required four main decisions, each covered by one subsubsection below:

3.1.1. Choosing the CBS to be Subjected to Requirements Elicitation. In choosing the CBS whose requirement ideas were to be generated, we observed that nowadays many CBSs are Web based. Therefore, we decided to use a Web site as the CBS and chose the Web site of a jazz festival in the Dolomites, FiemmeSkiJazz, http://www.fiemmeskijazz.com/, which was renamed "DolomitiSkiJazz" in 2009. The festival was in its eleventh edition in 2009, and its program includes jazz concerts and jam sessions offered by jazz musicians from the entire world, performing in ski lodges of the Dolomites.

3.1.2. Choosing the Subjects of the Experiment. Because the domain of the Web site, jazz music, was very specific, it was very easy to identify domain-expert subjects, namely musicians. These domain-expert musicians are easily distinguished from normal users of the Web site, i.e., tourists who would like to go to one or more of the concerts of the festival. We identified 13 musicians among mostly former students we knew as potential subjects of the first kind, the *musicians*. We identified many potential subjects of the second kind, the *analysts*, among the students of the Economics and Management Department's undergraduate Web-site-engineering course, which focused on Web-site quality. We contacted these potential subjects by e-mail, asking them to participate in our experiment. Six of the 13 musicians and 7 students agreed to participate in the experiment. For the benefit of testing H2, each of these subjects is classified as a user.

These numbers are at once (1) comparable to those recommended by Nielsen for usability inspections [17], thus minimizing the threat of too few subjects, and (2) small enough to allow the entire experiment to be conducted in one session, reducing the risk of inadvertently introducing differences, e.g., fatigue based on time of the day, when more than one session is needed. Nevertheless, that these subjects might not be representative of their types of users is a threat to the validity of this experiment.

3.1.3. Choosing Stakeholders as the Source of Viewpoints and Choosing the Subjects Representing Them. According to a general classification and to tourism marketing principles, the stakeholders for such a Web site can be classified into two main categories:

1) the organizers of the festival that owns the Web site, including the local tourist office, the collection of friends that had the initial idea for the festival and that annually contacts artists for the concerts, the Web-site implementers, the sponsors, the partners, and any tour operators that may be involved in organizing the festival,
2) the users of the Web site, including tourists, musicians, and occasional visitors of the Web site.

In each category, are users with different needs and domain knowledge, e.g., between the sponsors and the Web-site implementers and between tourists and musicians.

In the experiment, the students, who were learning Web-site implementation, represented one type of organizer, and the musicians represented one type of user. That is, each category of stakeholders is represented by subjects with knowledge equivalent to that of one type

of the category.

That these claims of representativeness might not hold is threat to the validity of the experiment.

3.1.4. Evaluating Generated Ideas. In the experiment described in this paper, the effectiveness of the CET, EPMcreate, is measured by two numbers about the ideas generated when using the CET: (1) the quantity, i.e., the raw number, of ideas and (2) the quality of the ideas, as measured by the 7Loci Metamodel of Web-Site Quality [10]. The 7Loci Metamodel was chosen because it is domain and purpose independent. Also MacCrimmon and Wagner used the quantity and quality of the ideas generated by CETs to compare the effectiveness of GENI, a computer-supported CET, with that of individual brainstorming [18].

Among the dimensions of the 7Loci Metamodel, *Identity*, concerns the image that the organization projects and all elements that work together to identify the site's owner. *Content* concerns the information available to the user, and *Services* concerns the services available to users. *Location* concerns the site's visibility and whether there is a place from which users can communicate with the organization and with each other. *Maintenance* concerns guaranteeing proper functioning and continued operation of the site, while *Usability* concerns how accessible and user friendly are the content and services of the site. *Feasibility* concerns initial and continued implementability and management of the site's services and project.

It is useful to classify each dimension into one of three groups: (1) *semantic*, (2) *syntactic*, and (3) *pragmatic* [19]. Content and Services are semantic dimensions; Location, Maintenance, and Usability are syntactic dimensions; and Identity and Feasibility are pragmatic dimensions.

The issue at hand is how to assess the quality of ideas generated by the use of a CET for a Web application. Previous work by the authors of this paper and Franch shows that the 7Loci-Metamodel-assessment-of-ideas carried out by 7Loci-Metamodel experts who were not experts in the Web application's domain was essentially the same as the-more-subjective-assessment-of-the-same-ideas carried out by experts in the Web application's domain [10]. Therefore, when objectivity is needed, as in conducting controlled experiments to test hypotheses H1 and H2, it is acceptable to use the 7Loci Metamodel to evaluate the quality of ideas.

3.2. Realization of the Experiment

The experiment was carried out on 23 October 2007 in a computer room of the Faculty of Economics at the University of Trento. Each subject could visit the Web site as he or she pleased and could write his or her ideas for requirements in a Word file that initially contained only the description of each step of EPMcreate. Each subject was native in Italian, and therefore, the contents of both the Web site and the Word file were written in Italian. For each step, the subject was shown a Venn diagram like that of Figure 1, with the relevant region colored in. Below the Venn diagram is a description in Italian of what the subject should focus on. An English translation of one such description is "Focusing on the needs of only the USERS OF THE WEBSITE, what would you change or add?" Finally, below the description are some blank lines to be filled in by the subject with the requirement ideas the subject generates while having the focus of the step. The duration of the experiment was one hour, not including the five minutes spent giving to the subjects preliminary instructions for the procedure to be followed in applying EPMcreate to the problem at hand.

4. Analysis of the Results

To properly interpret the results of the experiment, it was necessary to be able to preclude that differences in the results were due to differences in the creativity of the subjects. For this purpose, as in earlier experiments [9], we used an adult version of Frank Williams's Creativity Assessment Packet [20]. Results of the testing confirmed that the creativity levels of the two kinds of subjects were almost the same: the analysts' average score was 69.71 and the musicians' average score was 71.67. A Student's T-test of these data gave 0.349, which for the 0.10 confidence level, confirms that the difference between the averages was not significant [21, Page 90].

After conducting the experiment with the subjects, we gathered the subjects' Word files to evaluate the subjects' requirement ideas quantitatively and qualitatively. For each subject, each requirement idea was extracted from the subject's file and classified according to its possibly multiple dimensions. Duplicate requirement ideas from one subject were eliminated and thus not counted more than once. Any sentence containing more than one requirement idea was broken into atomic requirement ideas and each atomic idea was evaluated separately. The evaluation of requirement ideas was supervised by a senior, professional analyst, who was neither a subject nor an experimenter.

4.1. The Data

Table 1 summarizes the data yielded by the experiment. In this table,

- for each kind of subject and for each dimension,
  - the number in the column labeled by "# ideas" is the count of ideas generated by all subjects of the kind for the dimension,
  - and the number in the column labeled by "%-age" is the percentage of the total count of ideas generated for the dimension that the number to its left is;
- for each dimension, the number in the column labeled by "Total # ideas" is the count of ideas generated by all subjects for the dimension; and
- for each kind of subject and for each dimension, the number in the row labeled "%-age" is the percentage of the total count of ideas generated by the kind of subject that the number above it is.

Because we had 7 analysts and 6 musicians, it was necessary to normalize the number of requirements ideas per dimension for any kind of subject. This normalization was achieved by dividing the number by the number of subjects of the kind, to compute the average number of ideas per dimension by kind of subject. These numbers and their corresponding averages are shown in Table 2; this table shows also the value of the Student's T-test for each dimension. This table shows that each kind of subject generated a large number of requirement ideas, 174 by the analysts and 164 by the musicians. However, the average number of requirement ideas generated per subject of the two kinds are very similar, 24.86 by the analysts and 27.50 by the musicians. The same can be said for the average number of requirement ideas generated per subject for each dimension. The table shows by the absence of a row for "FEASIBILITY" that none of the generated requirement ideas was classified as a feasibility requirement.

For each kind of subject, a plurality of its generated requirement ideas were classified into the Content dimension, a semantic dimension, consistent with the fact that the Web site is mainly informative. The other semantic dimension, Services, ranked third. All together, the semantic dimensions, Content and Services, that play a very important role for the success of a Web site, contain 49.26% of the requirement ideas generated using EPMcreate. The syntactic dimensions, Identification, Management, and Usability, contain 30.39% of the requirement ideas generated using EPMcreate; finally, the pragmatic dimension, Identity, contains 20.35% of the requirement ideas generated using EPMcreate.

The biggest differences between the analysts and the musicians are in the average numbers of Management and Usability requirement ideas their individuals generated. The average analyst generated 0.57 Management and 3.14 Usability requirement ideas, while the average musician generated 0.17 Management and 5.50 Usability requirement ideas. Note that the Student's

Table 1. Classifications and Numbers of Requirements Found by Analysts and Musicians

7Loci Dimension	Analysts # ideas	Analysts %-age	Musicians # ideas	Musicians %-age	Total # ideas
Identity	**37**	53.62	**32**	46.38	**69**
%-age	21.26		19.39		20.35
Content	**62**	57.41	**46**	42.59	**108**
%-age	35.63		27.88		31.86
Services	**28**	47.46	**31**	52.54	**59**
%-age	16.09		18.80		17.40
Identification	**21**	48.84	**22**	51.16	**43**
%-age	12.07		13.33		12.68
Management	**4**	80.00	**1**	20.00	**5**
%-age	2.30		0.60		1.49
Usability	**22**	40.00	**33**	60.00	**55**
%-age	12.65		20.00		16.22
Total	**174**		**165**		**339**

Table 2. Average Numbers of Requirement Ideas and Student's T-test Values

Dimension	Analysts Tot.	Analysts Avg. of 7	Musicians Tot.	Musicians Avg. of 6	Student's T-test
IDENTITY	37	**5.29**	32	**5.33**	0.0254
CONTENT	62	**8.86**	46	**7.67**	0.4523
SERVICES	28	**4.00**	31	**5.17**	0.6996
IDENTIFICATION	21	**3.00**	22	**3.67**	0.4407
MANAGEMENT	4	**0.57**	1	**0.17**	1.1315
USABILITY	22	**3.14**	33	**5.50**	1.1310
Total	174	**24.86**	165	**27.50**	

Table 3. Number of Requirement Ideas Generated by Each Subject of the Two Kinds

	Subject Identity Number	**Williams Creativity Score**	**Number of Requirement Ideas Generated**
Analysts	1	81	31
	2	82	23
	3	68	22
	4	56	29
	5	65	16
	6	56	9
	7	80	44
	Average	**69.71**	**24.86**
Musicians	* 8	72	27
	9	71	25
	* 10	62	25
	11	78	49
	12	77	21
	* 13	70	18
	Average	**71.67**	**27.50**
	Overall Average	**70.62**	**26.07**

"*" marks a female subject

T-test values for these differences are the highest of all Student's T-test values and are nearly the same, at 1.1315 for Management and 1.1310 for Usability. These differences make sense when the expertises of the two kinds of subjects are considered.

- There were very few Management requirement ideas and analysts naturally found more of them than musicians. It is important to emphasize that none of the subjects of either kind was a computer professional. Subjects of either kind had similar, university-educated user knowledge in the use of computers and the Web. Moreover, the analyst subjects had taken a Web-site engineering course.
- Domain expertise, that is, knowing jazz music, appears to account for the musician's finding more Usability requirement ideas. A typical musician knows more than a typical analyst what could improve the user's navigation and experience in a music-oriented Web site. Another explanation for the musician's finding more Usability requirement ideas could be that a musician's knowing his or her own needs is likely to be more critical of any obstacles or deficiencies in the Web site.

The average analyst generated 4.00 Services requirement ideas, while the average musician generated 5.17 Service requirement ideas, and the Student's T-test value for this difference is 0.6996. However, the average analyst generated 8.86 Content requirement ideas, while the average musician generated 7.67 Content requirement ideas, and the Student's T-test value for this difference is 0.4523. Thus, the Student's T-test gave a higher relevance to the first of these differences.

The facts that

1) the average total numbers of ideas generated by the analysts and the musicians for each dimension and
2) the numbers of ideas generated by the analysts and the musicians for each dimension

were not statistically different could be interpreted, on one hand as the main characteristic of EPMcreate, that asking a subject to focus on different viewpoints allows also subjects not expert in the domain to better understand a variety of user needs needs. On the other hand, larger and more statistically significant differences are normally found in more complex domains, such as technical Web sites for physics or astronomy.

That musicians suggested very specific services can be explained by their knowledge of what a Jazz musician needs. For example, one musician proposed creating an online auction to sell pairings of unknown Jazz performers with well-known Jazz performers. Another proposed online voting by members of the public for their favorite Jazz performers; while the festival does not foresee giving any awards, such information could be used to organize future concerts or to help find specific strategies for promoting them, e.g., by suggestion which performers' names should be on any flyer announcing a future season of concerts.

It is interesting to observe that each kind of subject generated a high number of Identity requirement ideas, 5.29 by the average analyst and 5.33 by the average musician. These numbers and the Usability numbers suggest that users can be involved not only for Usability requirements, but also Identity requirements. After all, image-related issues are very important for all stakeholders of a Web site and ultimately for the success of the Web site.

4.2. Evaluation of the Hypotheses

This section decides if the data support any of the hypotheses.

The first hypothesis, H1, was that the EPMcreate technique can be applied for requirements elicitation by an individual, as opposed to a group. The results described in Section 4.1 confirm that EPMcreate can be applied by individuals. For each kind of subject, analysts or musicians, the average number of total requirement ideas per individual, 24.86 or 27.50 respectively, was judged to be satisfactory by two sources:

1) The author Mich, as an expert in Web-site quality and in Web-site requirements analysis [10], is comfortable to say that, given
   a) the size of the web site,
   b) the characteristics of the web site:
      - type: the site for an event;
      - target: musicians, tourists, and operators;
      - goals: to promote an event to support tourists' and musicians' participation in the event, and to promote the tourist destination in which the event takes place,

      and
   c) that each subject had only one hour in which to generate requirements ideas,

   the number of requirements ideas generated by the subjects was more than satisfactory.
2) Each of the owners of the Web site said that he was happy about the requirements ideas that were generated.

A more detailed analysis of the performances of the subjects is given in Table 3. If one were to plot for each subject, the number of requirement ideas he or she generated against his or her Williams creativity score from the data in this table, the scatter of points would appear to show that there is a low correlation

between the number of requirement ideas generated by a subject and the subject's Williams test score. Statistically, however, there is too much deviation for a correlation. Therefore, it is safe to say that there is no correlation between the number of requirement ideas generated by a subject and the subject's Williams test score. Thus, any observed differences in the numbers of ideas generated by the subjects cannot be explained by differences in the subjects' Williams test scores.

The overall results allow saying that EPMcreate can indeed be used also by individuals, each working alone to invent requirements. Only one out of the thirteen subjects, Subject 6, failed to finish his session, quitting after only 4 of the 16 steps. As he quit, he explained that it was too difficult to find ideas to improve the Web site because it was already quite good. We find it hard to accept his claim that the site was already quite good, because an evaluation of the Web site conducted by quality experts highlighted several critical deficiencies with the site. We believe the subject's claim that it was hard to find ideas to improve the Web site because this subject got the lowest score, 56, in the Williams test. We believe also that as a student, he was afraid of being judged unfavorably for his low results, even though we had assured the students that their grades were not affected by the results of this experiment.

Comparison of the data of this experiment with those of past experiments Anesi conducted with groups [9] allows confirming that EPMcreate is effective when used by individuals. Each of these experiments involved two groups of 4 subjects, one group applying brainstorming and one group applying EPMcreate, generating requirement ideas for one Web-based application. Each of these applications was larger than the Web site used for the current experiment, but the creativity sessions for them lasted 120 minutes and 100 minutes respectively, as opposed to 60 minutes for FiemmeSkiJazz. For one application, the EPMcreate group generated 71 requirement ideas, and for the other, the EPMcreate group generated 98 requirement ideas. To get a very crude estimate of what a group would do for FiemmeSkiJazz, multiply the average for an individual by 4 to get a number requirement ideas generated by a virtual group. Four times the analysts' average of 24.86 is 99.44, and four times the musicians' average of 27.50 is 110. Each of these numbers is definitely larger than either of the true group numbers. However, it is not clear how to factor time into these virtual group numbers of ideas generated to get truly comparable numbers. Four individuals, each working one hour, spends a total of 4 hours. Thus, the virtual group had more time available for idea generation than any of the real groups. Moreover, a real group loses time to group overhead that an individual does not suffer. Additionally, the ideas of 4 individuals may overlap so that the true number of requirement ideas generated is less than 4 times the individual average.

To compare the numbers of ideas generated by the virtual groups to those of the real groups, we need to consider the control effects of the true groups: people in a true group have to propose, formulate, and write down proposed requirement ideas; even though the group members were given strong recommendations not to judge any raw idea from any member, in practice, there is interference that causes ideas to be lost.

The second hypothesis, H2, was that the EPMcreate technique can be applied for requirements elicitation by a domain-expert end user. While support for hypothesis H1 came from the quantity of requirement ideas generated by the subjects, support for hypothesis H2 must come from consideration of the quality of the requirement ideas, as measured by an expert in the Web site's domain. The chosen domain expert was the manager of the local tourist office that was in charge also for marketing the festival. He had not participated in the experiment itself in order to avoid his possibly influencing the ideas generated. In addition to the generated ideas, we gave him the results of a marketing study, conducted by the students of the Economics Faculty's Marketing course, that analyzed the communication strategies of the event. The study reported that one weakness of the event's communication was the inadequate use of the site for promoting and branding the Web site. We gave the requirement ideas generated by the subjects to the chosen domain expert, we received two types of feedback:

1) The first type of feedback was given verbally to one of the authors of this paper. This feedback gave an evaluation of "satisfactory" to all the generated requirement ideas. The quality of these requirement ideas is indicated by the fact that the owner of the Web site found some of these ideas useful for solving the event's communication problems.
2) The second type of feedback was obtained implicitly by our and the Web master's determining how many of the generated requirement ideas had already been implemented in the revised version of the Web site. All requirement ideas had been implemented in the new site, *except*
    - those that required changes in the organizational strategies;

- some that required investments that were too high given (1) the limited budget of the event and (2) the limited return one could expect from their implementation;
- some that were re-interpreted to address the trade-off between organizational effort and return.

5. Conclusions

The experiment described in this paper was done to answer two questions:

1) Could EPMcreate be used to generate requirement ideas for a Web site by requirement analysts working alone instead of only in groups? and
2) Could EPMcreate be used to generate requirement ideas for a Web site by users expert in the Web site's domain rather than only requirement analysts?

The experiment involved 13 subjects divided into two kinds. The first kind of subject was an undergraduate Economics student studying a course about building quality Web sites, serving as an analyst. The second kind of subject was a university-educated jazz musician, an expert in the domain of the FiemmeSkiJazz Web site. The results of the experiment allow giving a positive answer to both questions. However, because of the threats to the validity of the experiment, it is best to consider the hypothesis supported for the situation of the experiment. Certainly, similar experiments need to be carried on other applications, using only actual stakeholders and other configurations of stakeholder viewpoints.

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