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The Role of Groupware in Requirements Specification

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Abstract

This article describes how two forms of groupware - Electronic Mail and Group Support Systems (GSS) were employed to support user requirements specification in a university department. The system being specified was a bibliographic information system, while the users were both qualified systems analysts and academic staff in the department. The background literatures to both requirements specification and GSS are introduced and linked. Groupware tools were used to support the group interaction and consensus formation. The article discusses the key stages in this process and discusses the appropriateness of the techniques used. The results are significant in that they identify techniques appropriate to supporting user groups in the clarification of system requirements before the involvement of development personnel.

1. Introduction

> "You can never inspect quality into products. You can only build it into them" (Tsurumi, 1981, p.8).
>
> "Information systems take too long to build, cost far too much to build and maintain and, even worse, frequently do not end up meeting user needs". (Wanninger and Dickson, 1992a, p.310).

These are some of the frequently heard, if disparate sentiments in the information systems development community. We aspire to produce quality systems, and also to involve users in the systems design process, yet the results are not always up to our, or the users',

expectations. It has long been recognised that the correct specification of system requirements plays a crucial role in ensuring the usability of a system. It is irresponsible to build a system based upon inadequate definition, in the hope that it will meet the customers' needs. The necessity of defining systems correctly before building them can perhaps best be illustrated with reference to Boehm's (1976) observation that mistakes not discovered until a system is operational cost one hundred times more to correct than would have been the case had the problems been noticed in the design phase.

In the following sections, the background to the project, the project objectives and the people involved in the project are introduced and described. Next the Requirements Specification and Group Support Systems (GSS) literatures are reviewed and subsequently integrated with reference to earlier projects that have attempted to marry the two disciplines. Following this, the various stages undertaken in this project are described from the initial invitation to participate via email through to the end of the project. Finally, the lessons learned in the project, and the difficulties encountered, are discussed followed by conclusions.

2. Research Problem and Objective

This article describes how a group of users used two groupware tools (Electronic Mail and Group Support Systems) to elicit requirements for a bibliographic information system, i.e. a system that would record, manipulate and disseminate details such as author name(s), title, place of publication, page number(s), and so forth for books, journal articles, conference papers, electronic mails, microfilms and CDs-ROM, to give a few examples. Such a system would be central within the department (rather like an electronic mail system), but its functionality was not defined beyond this point. The user-designers were to be responsible for generating the system requirements. The users are also experts in system design as they teach this subject within the department, wherein they stress the necessity for user participation. They also work with computer systems whose design they were not consulted on. Thus, this project gave them what was, ironically, an all too rare opportunity to practice what they preach. Although management initially supported the participation of the user-designers in the project (and indicated that funding would be made available to develop the system from the requirements), the key motivator for the project was the fact that the department had recently hired its own systems developers, in order to become autonomous from the centralised

computer centre operated by the university. Without these newly hired people, it is unlikely that the project would have been initiated.

3. Requirements Specification

Many people need to be involved in the development of systems simply because no one person possesses all the knowledge and information required for the task. Furthermore, since many people are likely to use a system, it is advantageous to gather many opinions when eliciting requirements. In addition, since there may be more than one way to use a given system, so the different perspectives of different users with their different levels of experience are all valuable. Thus, the requirements specification phase of system design should be a joint, collaborative process that involves managers (who are going to signoff on the design specification and pay for the resultant system), systems analysts/programmers (who will design and build the system) and, perhaps most importantly, users (who have to use (or cope with) whatever is produced). Eason (1988), cited in Macaulay (1992), suggests three options for systems specification and design:

- Technical Centred Design - customers commission and later accept the system. They are informed and consulted throughout the design process;
- Joint Customer-Specialist Design - user representatives are involved in all stages of the design process;
- User-Centred Design - technical experts provide a technical service to the users and all users contribute to the design.

All three options have advantages and disadvantages and Eason (ibid.) does not consider there to be a single 'best' solution. Traditionally, systems analysts have followed the 'Technical Centred Design' approach, gathering data from users through interviews, often on a one-to-one basis. This process is fraught with difficulties not least because there will be as many definitions, opinions, approaches and concepts of a system as there are interviewees. There may need to be several cycles of interviews so as to clarify issues with all users concerned before the requirements elicitation process can be considered complete. Even then, it is difficult to integrate all the ideas and views into a meaningful and coherent set of system requirements, particularly one that is going to result in a system acceptable to management and usable by all users (Macaulay, 1992). Rockart (1979) has suggested that sometimes a Critical Success Factors approach should be used in order to identify the primary goals

(Vitalari and Dickson, 1983) that must be achieved for a successful solution, before proceeding to secondary, less critical goals.

Vitalari and Dickson (1983, p.949) raise a number of other salient issues regarding the role of the analyst, commenting: "Perhaps the most problematic and least understood area of analyst skill is in the information requirements determination task". They observe (ibid.) that: "solutions to analysis problems require interdisciplinary knowledge and skill" and "… the analyst must be ready to incorporate changes in the technology … and to participate with users in different ways". Clearly the role of an analyst is not an easy one, least of all when the users are unfamiliar with the technology (and new ways of performing actions), the jargon used by analysts, and very often with the nature and complexity of the task itself, which is precisely why many users have to be consulted so as to gain a broader view of the system.

The Joint Customer-Specialist Design approach represents an improvement, but since representatives are used, it does mean that some users will not have their opinions heard. Furthermore, political factors may be involved in the selection of representatives, i.e. they may be either nominated by management or elected by the people they are representing. Their capability to 'represent' others will be much enhanced if they are trusted and confided in by their electors. In User Centred Design, all users can be involved in the requirements analysis process, but this is generally seen as resource inefficient with commissioning organisations typically not following this approach. At the same time, the problems illustrated above with respect to user-management conflict and user understanding of the issues involved in requirements analysis still prevail.

4. Group Support Systems

Group Support Systems (GSS) are typically encountered as "a suite of software tools used to focus and structure group deliberation, reduce the cognitive cost of communication, and ease the burden of information access as team members make a joint cognitive effort towards a goal" (Davison and Briggs, 1997). GSS technology is primarily directed at meetings and aims to make those meetings more productive, satisfying and participative by structuring and supporting the communication and collaboration functions that take place. Specific activities supported by GSS include: idea generation and categorisation, stakeholder identification, idea

evaluation (voting, ranking, scaling), and group authoring. GSS thereby enable participants to undertake more complex and unstructured tasks than they would normally be able to.

Fifteen years of research into GSS has produced a plethora of results, yet these are not entirely consistent (Pervan, 1994). In field studies, however, research shows that groups that employ GSS are generally more efficient than unsupported groups (Dennis et al., 1990a, Nunamaker et al., 1988). This efficiency may be due to the fact that since all users can participate simultaneously, so the time for interaction is extended without lengthening the duration of the meeting. A second useful measure is the willingness of clients to return and use a GSS on subsequent occasions, a number of authors describing this repeat business (Dennis et al., 1990b; Post, 1993; Hitchcock et al., 1994; de Vreede, 1997). Where meeting participant satisfaction is concerned, again GSS supported groups report higher levels of satisfaction than unsupported groups (e.g. Nunamaker et al., 1989b; Pervan, 1994). However, it has also been observed that face-to-face meetings, where the full range of audio, visual and emotional cues are available to participants, are more satisfying than distributed meetings. Equally, groups that are working on integrative or win-win projects tend to be more satisfied than those whose tasks involve less positive situations (Nunamaker et al., 1991).

Other benefits that are attributed to GSS relate specifically to improvements in the communication and participation processes. For example, since all participants can generate ideas simultaneously, so nobody forgets what they want to say while waiting for a turn to speak, and the discussion is not dominated by a strong or loud personality. Earlier social science research into group interactions revealed that some members of a group do not participate (communicate) as fully as they might. This reduced participation is referred to as a process loss, defined by Miner (1984) after Steiner (1972), as the "difference between potential and actual group performance". Process losses are primarily related to the influence that some participants are able to exert on other participants (influence behaviour)(cf. Latané, 1981. Assuming that participation does take place, no matter how limited it is, process losses can also be evident in the quality, creativity and openness of discussions. Tan et al. (1993) summarise process losses as follows:

> the unwillingness of lower status members to criticise the opinions of a high status member, "due to a fear of negative evaluation and reprisals,

resulting in evaluation apprehension" (Diehl and Stroebe, 1987; Lamm and Trommsdorf, 1973);

the tendency of lower status members to conform to an expected standard (Hackman and Kaplan, 1974; Shaw, 1981) or to the standard of higher status members (Hollander, 1964);

the non or low participation of low status group members in the discussion process, resulting in "cognitive inertia" where the line of argument taken by the group will very likely adhere to that which the high status member(s) wish(es) (Jablin and Seibold, 1978; Lamm and Trommsdorf, 1973).

The process losses described above can be addressed through the provision of anonymous communications, if the group feels that this is appropriate. Thus, people need not worry about receiving negative evaluations from peers or superiors for submitting an unusual or unpopular idea, nor about conforming to the expectations of influential others. A great deal of empirical research suggests that the two features of GSS described above - parallel input and anonymity - cause groups using GSS to produce more and higher-quality ideas than teams using conventional meeting methods (cf. Connolly, Routhiaux, & Schneider, 1993).

5. Group Support Systems as a Facilitating Technology for Requirements Specification

Various authors including Wanninger and Dickson (1992a), Liou and Chen (1993) and Carmel et al. (1994) have called for an integration of GSS and the systems design methodology Joint Application Development (JAD). JAD originated at IBM in the late 1970s, though its use to date appears to have been confined to industry. It is described in manuals, books and the trade press, and is one of Yourdon's (1992) 'eleven silver bullets'. Carmel et al. (1993, 1994) provide detailed descriptions of the methodology and its reported benefits. In JAD, users are involved in "a series of structured meetings which, traditionally, have benefited from little explicit computer support" (Carmel et al., 1994, p.13). JAD appears, however, to lend itself to GSS support, given the structured nature of its processes. Such an integration would "facilitate and support group user involvement in the development process, especially in the requirements definition stage … [and thus] enhance user involvement beyond what JAD is typically able to achieve" (Wanninger and Dickson, 1992a, p.310). GSS has also been combined with other methodologies, for example the GRIPPPER™ (Group

Requirements Identification Process, Prototype, Pilot, Education and Rollout) approach (Wanninger and Dickson, 1992b) for new product development to integrate customers, designers and developers. See Muller and de Vreede (1995) for an application of GRIPPPER™ to a systems development project titled 'Charlotte' in the Dutch national telecommunications company PTT Telecom.

Although the advantages of what Carmel et al. (1994) characterise as E-JAD (Electronic JAD) are evident and not disputed, E-JAD still relies on the premise that the users need to be involved with other systems development personnel. In the project described in this article, the users themselves are competent analysts in their own right and are designing a system for themselves. This project thus follows on from the work of earlier authors, using a User Centred Design approach, but avoids JAD as an explicit methodology. The resource inefficiencies of use should be minimised given the improved productivity expected with a GSS supported process. Likewise, GSS should enhance both the number and quality of ideas generated, as well as increasing participation in and satisfaction with the process.

In this project, two groupware tools were employed. A standard electronic mail package - MS Mail™ - was used initially to invite participation and collect ideas. These ideas were then transferred to a GSS - GroupSystems for Windows™ - for more structured discussion and evaluation. The processes are described in the following section.

6. Designing a Bibliographic Information System

6.1 Background and Initial Requirements Elicitation

The City University of Hong Kong is a twelve-year old tertiary education institution in Hong Kong, offering certificate, diploma, undergraduate and post-graduate degree courses in a variety of subject areas. The Department of Information Systems (department), where the research was carried out is an academic department with some 24 full-time academic staff, as well as 12 full-time research students.

The author and a colleague initiated a project to design and develop, in-house, a bibliographic information system. This was a real project, in that management support was given for the design and development, and it was expected that the completed system would have

significant benefits for most staff in the department. In the first stage of the project, the aims and objectives of the system were explained to all staff in the department by email. Email has been used for a number of years as a medium for communication of ideas, directives and policies to members of the university staff. Interested parties were invited to make comments on the proposal, also by email. These comments, together with material from the original email proposal were collected and an 18-item questionnaire was drawn up to reflect the issues raised. The questionnaire was emailed to all 41 academic staff, technical staff and postgraduate students in the department. In all, a total of 18 questionnaires (44%) were returned, after two reminding emails were sent out.

6.2 Analysis of Questionnaire Data

Analysis of the data obtained from the questionnaire survey shows that of the 18 respondents, 75% agreed about 50% of the design issues. These include items such as: the system should be Windows based; the system should provide hypertext links to related articles; the system should permit each bibliographic entry to have an attached description/abstract of the article/item. The most contentious issues, where similar numbers of respondents had positive and negative views included: should the author of an entry (not the author of the article itself) have the right to restrict its availability to: all staff (no restrictions); some staff (perhaps a focused research group); and to no staff except him/her-self, (i.e. a personal bibliographic system).

6.3 Detailed Requirements Specification

Having used electronic mail to generate initial ideas on possible system functionality and subsequently to elicit views on questionnaire items, GSS was used to support detailed idea generation and subsequent evaluation of the more contentious issues.

6.3.1 The First Idea Generation Session

Participation in this stage of the process was not so substantial as had been the case in the electronic mail phases. All 18 respondents to the original questionnaire were emailed an invitation to participate in a face-to-face GSS-supported meeting at a time when no teaching classes were scheduled. Follow up telephone calls to individuals were used to try to ensure a high turnout. In the event, only 6 of the 18 staff/students turned up for the first GSS session. Reasons for this low turnout are discussed in section 7 below.

Although only one of the participants had previously used the GSS, participants were quick to learn how to use it and this did not pose significant interaction problems. Of these 6 participants, 5 were members of the academic staff, while the 6th was a research student. All were familiar with the process of requirements elicitation/specification. Discussion in this session was serious, but interspersed with some jovial bantering. 54 comments on 7 topics were generated in a 20 minute period. Voting was conducted at the end of this session, but this proved divisive. The only issue which the participants could agree upon was that the system should produce output in formats other than Windows applications', primarily Word for Macintosh and WordPerfect for DOS.

6.3.2 The Second Idea Generation Session

At the following session one week later, the researcher decided to provide greater focus to the discussion by limiting the number of "topics" to just two. It was felt that a major problem with the first session had been a lack of discussion focus. This was partly due to insufficient numbers of participants. Furthermore, rather than merely generating ideas, participants had to analyse issues and argue for their viewpoints persuasively. Attempting to undertake these various activities across seven related, but not identical, topics was likely to blur any focus that existed.

As in the first session, only 6 participants turned up. They were all briefed on the results of the previous meeting and informed that it was necessary to focus more deeply on the two issues involved. To strengthen the focus, a brainstorming tool was used first to generate ideas on a single item - the advantages and disadvantages of restricting the access of the system. This proved useful, but participants had the tendency of allowing the discussion to veer off the main issue. After 15 minutes, 21 ideas had been generated.

Having more clearly identified the issues at stake, the topic commenting tool was used to discuss issues further. Participants were allowed, initially, to generate one topic each. Later an additional four topics were included to make a total of ten. Over a 35 minute period, 101 comments were generated. As in the first session, participants were unable to focus on the sole issue of how restricted the system should be. While they did discuss this, they also diverged into other areas such as: who will be responsible for entering data; should we

consider developing a CD-ROM based application; are we doing more than developing a glorified library system; and so on.

Following this discussion, an evaluation of ideas was conducted to determine whether any consensus existed on the issues discussed. Participants were allowed to submit as many ballot items for evaluation as they wished. In all, fifteen ballot items were submitted. A five point Likert-type scale evaluation method was used with no by-pass permitted. Of the fifteen ballot items, six received ratings of 4 or above (5 = strongly agree; 1 = strongly disagree) and a further six fell in the range 3-3.99. The items that received highest and lowest levels of approval are presented in Table I below.

Table I: Summary of items receiving highest and lowest scores in final ballot.

1	Do not develop the system until advantages are more clearly defined	4.83
2	Clearly define the requirements before making any decisions of restricted access	4.5
3	The system should be available for anyone to read	2.83
4	Access to the system should be restricted to staff only	2.5

As will readily be recognised, the two items which received the highest degree of agreement (1 and 2), are not in fact system requirements at all, but process issues. The two items which received least agreement (3 and 4) are system requirements. While it was encouraging that the system requirements received no worse than mixed feelings, it was noteworthy that after two sessions of idea generation and evaluation, the participants strongly believed that they (or perhaps someone else) needed more time to discuss high level issues, for example general requirements and benefits of developing such a bibliographic information system.

Unfortunately, the project folded at this point due to apathy on the part of the participants who refused to attend further sessions, citing lack of time. In addition, some participants privately expressed concern at the way that the meetings were handled and did not believe that consensus was achievable. Reasons for this are discussed below.

7. Discussion

In the initial stages of the research, project activities seemed to progress quite smoothly. Many members of the department expressed an interest in the project, as evidenced by the 44% return rate of questionnaires. However, the number of people willing to be involved in

more detailed face-to-face discussions dropped significantly. It is possible that they were simply not free at the times chosen for discussion, but given the fact that the system would be of use to many of them, it was felt that this was a sufficient motivating factor. The time slot selected is normally reserved for departmental meetings and in fact such a meeting was held immediately prior to the first GSS session. This in itself ensured that many of the potentially interested people were potentially available.

The email phase of the requirements elicitation process proved most useful in that the components of the proposed system that a majority of participants agreed upon could be identified efficiently and effectively. With two exceptions, all questionnaires were returned electronically. Email is extensively used in the organisation as a means of information dissemination, though it is much less frequently used for information gathering in a structured format, such as a questionnaire. However, it is reasonable to assume that the prevailing email culture of the organisation made it a suitable distribution channel for initial requests for ideas and subsequent questionnaire distribution. The purpose of this stage of the project was not to reach any consensus or decision but simply to facilitate the communication of ideas. In this, it succeeded admirably.

Where the use of the GSS is concerned, considerable task focus problems were encountered. In the first session, as already described above, there appeared to be a noticeable lack of discussion direction. Although a reasonable number of ideas were generated, some 35% can be considered redundant and/or unoriginal, i.e. they are either irrelevant to the topics ("so let's restrict the system to information theory"), do not add new ideas ("Yes", "No", "I agree") or irreverent ("basically this is a silly idea"). This number is disturbingly high, though the vast majority of such responses are in the 'not adding new ideas' category.

In the second session, the initial brainstorming allowed participants to get a feel for the ideas of others before committing themselves to more precise statements. The use of the topic commenter tool in the second session was very productive. Ideas became much more focused, in the sense that virtually all ideas were all relevant to the overall topic, yet they were not as restricted to the intended topic (restriction of the system's availability) as had been planned. Despite this improved focus, it is perhaps ironical that the most agreed upon item in the final vote should be: "do not develop the system until advantages have been more clearly defined".

Although this is a strong argument in favour of continuing the discussion process, unfortunately this did not happen.

In that the bibliographic system was never built, the project may be considered to have failed. However, there are strong lessons to be learned which make the project a worthwhile experience. Participation, which appeared to be high initially, dropped and eventually dried up altogether. It can be speculated that the lack of an authoritative 'manager' to oversee and control the project was instrumental in the lack of task focus in the early stages and also in guiding consensus. GSS have been lauded for reducing the effects of a single dominant personality and for increasing participation, but occasional domination could be advantageous, particularly if group members are apt to wander off the task. Had a traditional approach to system development been used, one or two users would have been consulted and their ideas might have found their way into the final system specifications. Systems analysts, paid to get a job done, would have done exactly that, though whether anyone would have used the resultant system is another matter. The literature would indicate a high probability of user rejection.

An alternative, and persuasive explanation of the failure was given by one of the participants, himself a former cataloguer in a major British library. He suggested that the complexity of the task was extreme, yet that none of the other participants realised this. He observed that the number of different types of materials which might need to be included in a bibliographic information system was very high and the participants typically did not have the expertise required for requirements analysis in this area. Vitalari and Dickson's (1983) comment about the need for system analysts to have interdisciplinary knowledge and skills is all too poignant in this context. The clear suggestion is that it would have been invaluable to have a library science specialist on the team. This participant further suggested that only when the task complexity became apparent did the other participants realise how much time and effort would be involved and this proved a strong disincentive to continue with the project. The fact that the participants agreed that they needed more time for discussion, but were reluctant to put in more time, tends to support this explanation.

On balance, it would appear that while users were initially interested in the project, they may have had an unrealistic appreciation of the task complexity. This was not a major problem

during simple idea generation phases of the project, but when the complexity became more clear, so too did the difficulties that the users experienced. Including a subject specialist on the team would very likely have alleviated these difficulties, or at least made them apparent earlier in the requirements analysis process. Including a representative of management would also have been sensible, so as to ensure that the project kept on track.

8. Conclusion and Further Research

Several conclusions can be drawn from this project. Following a review and integration of the GSS and requirements specification literatures, it is apparent that there are opportunities for improving the traditional requirements elicitation process at least as far as users are concerned. GSS can certainly enhance the participation of users in this process and provide an environment where they can contribute freely without fear of evaluation of conformance pressure. Nonetheless, the difficulties involved in the requirements elicitation and specification process are all too real as this case has illustrated. Even users who are themselves systems analysts or requirements engineers do not necessarily possess all the skills and knowledge needed for this interdisciplinary activity. Understanding and managing task complexity is crucial to a successful project. Although this project did not succeed in delivering a set of system requirements, it has illustrated the potential for groupware in assisting or supporting the requirements specification phase of systems development. Further studies can build upon this project, and earlier work, to achieve a better integration of users into the systems design process than methodologies that do not have computer support have been able to achieve.

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Appendix: Questionnaire items and aggregate scores

Question	SA	A	N	D	SD	Missing Values
The System should be Windows based	13	3	0	0	2	0
The system should provide hypertext links to related articles	10	6	2	0	0	0
The system should be able to generate output in different formats (different journals require different standards of citation, e.g. APA, ...,...)	4	7	5	1	0	1
The system should be able to generate output in MS Word for Windows format.-	1	10	5	1	1	1
The system should be able to generate output in WordPerfect for DOS format -	3	0	9	3	0	3
The system should be able to generate output in WordPerfect for Windows format	3	2	8	2	0	3
The system should be able to generate output in MS Word for Macintosh format	3	6	4	2	2	1
The system should be able to take as input the various CD-ROM generated citation styles	6	7	4	1	0	0
The system should allow each entry to have an attached description/abstract of the article	11	4	2	1	0	0
The description should be searchable, e.g. keyword search	14	3	0	0	0	1
The system should be multi-indexed, e.g. by author, title, journal name	11	5	1	0	0	1
Only an author of an entry can edit that entry	8	5	3	2	0	0
An author of an entry can decide if that entry is made available to all staff	5	8	1	1	3	0
An author of an entry can decide if that entry is made available to some staff	2	5	4	2	5	0
An author of an entry can decide if that entry is made available to no staff except him/her-self	2	2	7	1	6	0
If someone lends a copy of an article to someone else, it should be possible to record who the article is lent to	3	7	5	2	1	0
The system should not be restricted to any particular format of article, e.g.: book, journal, paper, newspaper article, project, thesis	5	10	2	1	0	0
The system should process queries quickly - 0.1 seconds per query is suggested	5	4	7	2	0	0
Access to the system is via username (this will help verify entry author ID)	6	3	4	4	1	0
It should be possible to invoke msmail from within the system so as to request an article from someone	4	10	3	1	0	0
Authors of entries should be committed to update their entries regularly	6	4	5	1	2	0
It should be possible to upload/download data to/from	8	9	0	1	0	0

a local hard-disk						
You find it convenient to answer this kind of electronic questionnaire	3	9	3	2	1	0

Notes: This is an excel file of voting patterns for the paper.

Ballot Item	SA (5)	A (4)	N (3)	D (2)	SD (1)	Total	Mean	STD	n	You	Zval					
Do not develop the system until advantages are more clearly defined	5	1	0	0	0	29	4.83	0.41	6	5	0.41	10	29	4.83	0.41	5
Clearly define the requirements before making any decisions of restricted access	3	3	0	0	0	27	4.5	0.55	6	4	-0.91	12	27	4.5	0.55	4
Only allow entry maintenance to author and system operator	5	0	0	0	1	26	4.33	1.63	6	1	-2.04	5	26	4.33	1.63	1
Only authors of entries should be able to have write/delete access	3	2	0	1	0	25	4.17	1.17	6	5	0.71	11	25	4.17	1.17	5
General data input form, to allow conversion between reference formats	4	1	0	0	1	25	4.17	1.6	6	5	0.52	0	25	4.17	1.6	5
The system should restrict the users who can submit entries	1	4	1	0	0	24	4	0.63	6	4	0	8	24	4	0.63	4
We should be provided with coffe tokens while participating in this session	4	0	0	0	2	22	3.67	2.07	6	1	-1.29	14	22	3.67	2.07	1
define different levels of restricted access	2	1	1	2	0	21	3.5	1.38	6	5	1.09	2	21	3.5	1.38	5
The system should not have any restrictions on who can read items	3	1	0	0	2	21	3.5	1.97	6	5	0.76	9	21	3.5	1.97	5
Allow each participant to enter his/her list in his/her own preferred format	2	1	1	0	2	19	3.17	1.83	6	5	1	7	19	3.17	1.83	5
The #1 implementation issue is someone else doing the data entry	2	0	2	0	2	18	3	1.79	6	1	-1.12	1	18	3	1.79	1
hire someone to take a collection of articles and enter them into the system	2	0	2	0	2	18	3	1.79	6	1	-1.12	13	18	3	1.79	1
The system should restrict the content of entries	0	3	1	0	2	17	2.83	1.47	6	1	-1.25	6	17	2.83	1.47	1
The system should be freely available for anybody to READ.	1	2	0	1	2	17	2.83	1.72	6	4	0.68	4	17	2.83	1.72	4
Restrict access to staff only	1	1	0	2	2	15	2.5	1.64	6	4	0.91	3	15	2.5	1.64	4