

INFORMATION SOCIETIES TECHNOLOGY (IST) PROGRAMME



STATUS

"Software Architecture for Usability"

WORKPACKAGE 6:

DELIVERABLE D.6.3. Analysis and comparison of usability of old and new developments

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DOCUMENT CONTROL

Registration of Changes

Date	Version	Author of Changes	Comments
March 20, 2004	0.1	Ana M. Moreno, Natalia Juristo	Initial structure with LogicDIS results of old e-Suite
April 10, 2004	0.2	Ana M. Moreno, Natalia Juristo	English review with appendixes related to LogicDIS old e-Suite
October 20, 2004	0.3	Ana M. Moreno, Natalia Juristo	First draft of LogicDIS results of new e-Suite
November 10, 2004	0.4	Ana M. Moreno, Natalia Juristo	Second draft of the whole deliverable
Noviembre 16, 2004	1.0	Dimitris Tsiros	Final version

List of Related STATUS Documents

Document Name	Version
Technical Annex	1.0
D.6.2.	1.0

ACRONYMS AND ABBREVIATIONS

Acronyms and abbreviations	Meaning
WP	Workpackage
STATUS	Software Architecture for Usability
WL	Workpackages Leader
TL	Task Leader
IHG	Information Highway Group
UPM	Universidad Politécnica de Madrid
RuG	University of Groningen
ICTSM	Imperial College

TABLE OF CONTENTS

DOCUMENT CONTROL	2
ACRONYMS AND ABBREVIATIONS	3
1. INTRODUCTION.....	5
1.1 PURPOSE.....	5
1.2 DOCUMENT STRUCTURE.....	5
2. USABILITY EVALUATION OF THE ORIGINAL VERSION OF E-SUITE.....	6
2.1 LONG QUESTIONNAIRE RESULTS.....	6
2.2 RESULTS OF THE SHORT QUESTIONNAIRE	8
2.3 RESULTING USABILITY VALUE FOR OLD VERSION OF E-SUITE.....	10
3. USABILITY EVALUATION OF NEW VERSION OF E-SUITE.....	11
3.1 COMPARISON AND DISCUSSION OF USABILITY RESULTS FOR E-SUITE	12
4. USABILITY IMPROVEMENTS OF COMPRESSOR.....	¡ERROR! MARCADOR NO DEFINIDO.
4.1 USABILITY EVALUATION OF ORIGINAL VERSION OF COMPRESSOR.....	¡ERROR! MARCADOR NO DEFINIDO.
4.2 USABILITY EVALUATION OF NEW VERSION OF COMPRESSOR.....	¡ERROR! MARCADOR NO DEFINIDO.
4.3 COMPARISON AND DISCUSSION OF USABILITY RESULTS	¡ERROR! MARCADOR NO DEFINIDO.
5. DISCUSSION OF THE USABILITY IMPROVEMENTS ACHIEVED AFTER APPLYING STATUS RESULTS	14
ANNEX A: LONG QUESTIONNAIRE FOR ESUITE	15
ANNEX B: SHORT QUESTIONNAIRE FOR ESUITE.....	28
ANNEX C: RESULTS OF THE LONG QUESTIONNAIRE FOR OLD ESUITE.....	31
ANNEX D: RESULTS OF THE SHORT QUESTIONNAIRE FOR OLD ESUITE.....	33
ANNEX E: RESULTS OF THE SHORT QUESTIONNAIRE FOR NEW ESUITE	34

1. INTRODUCTION

1.1 Purpose

The purpose of this deliverable is to show the usability improvements achieved by applying STATUS results by LogicDIS. For this purpose, the industrial partner redesigned and reimplemented one application using the STATUS results. This application is named e-Suite. The new design has been detailed in D.6.2. Development of New e-Suite. To evaluate the usability improvements of the redeveloped application, we have compared their usability with the usability of the original version. As we will see in this deliverable, after the comparison, we found that the new application, developed using STATUS results, is rated by users as being more usable than the earlier application that did not contain STATUS results.

1.2 Document Structure

The document has been organised to examine the usability improvements in each of the application developed by the industrial partner. Readers will find in section 2 the results of the usability evaluation conducted on the original version of the e-Suite; section 3 shows the results of the usability evaluation of the new version of the application, and section 4 offers a broad discussion of the usability improvements achieved after applying STATUS results in view of the experience described in the preceding sections.

2. USABILITY EVALUATION OF THE ORIGINAL VERSION OF E-SUITE

The usability evaluations of the original version of e-Suite were conducted by users from different companies that regularly use this application. These companies are Germanos, Friesland and LogicDIS. A total of 17 users from these three companies participated in the evaluation.

Two types of questionnaire were used for these evaluations: what we have called the “long questionnaire”, which was described in the Usability Evaluation Plan and is presented in Annex A, and an abridged version of this questionnaire, which we have called “short questionnaire” and which is presented in Annex B.

The “long questionnaire” contains a total of 66 questions concerning the usability of the system under evaluation. These 66 questions include duplications designed to raise questionnaire reliability. In other words, the questionnaire is really composed of 33 questions that we called direct and another 33 that we called contrary. These contrary questions aim to gather the same information as the direct questions, but are formulated differently. The purpose of this duplication is to check that the respondent is answering the questionnaire conscientiously, i.e., that he or she has properly understood the questions and is not responding at random. In other words, this replication can be used to validate the questionnaire responses.

However, as it takes users a considerable length of time (from 30 to 45 minutes) to answer all the long questionnaire questions and it is hard to find users who have all that time to spend on the questionnaires, following LogicDIS suggestions we have developed a short version of this questionnaire. The objective of using this short questionnaire is to allow LogicDIS to work with more users, gathering more usability information. The short version of the questionnaire was designed by removing the 33 questions designed to assure questionnaire reliability, as well as any questions that were not strictly applicable to the original version of e-Suite. Briefly, the short questionnaire contains 11 questions that are equivalent to the corresponding long questionnaire questions listed in Annex A.

2.1 Long Questionnaire Results

Five users from Germanos completed the “long questionnaire”. UPM travelled to Athens to guide LogicDIS members of STATUS to pass the questionnaires and to perform the usability evaluation. UPM helped users to solve some doubts with the questionnaire, while LogicDIS also got new ideas to improve the usability of the new application during the discussions with the users. The characteristics of these users are shown in Table 1. As we can see, they are all fairly knowledgeable in the problem domain, experienced in computer use and familiar with the system under evaluation.

Characteristic	Range	Number of users
Domain knowledge	Unknowledgeable: under one year working in the domain	0
	Fairly knowledgeable: from one up to two years working in the domain	5
	Expert: over two years working in the domain	0
Experience in computer use	Novice: under six months	0
	Fairly experienced: from six months up to one year	1
	Very experienced: from one year up to two years	1
	Expert: over two years	3
Knowledge of system under evaluation	Novice: under three months	0
	Expert: over three months	5

Table 1. Characteristics of Germanos users for long questionnaire

LogicDIS collected all the answers to the questionnaires and sent them to UPM who compiled them and made the corresponding analysis with the data. Annex C sets out the answers for each question of the questionnaire.

To properly understand Annex C, remember that the complementary values of the responses to questions that are formulated negatively (that is, the questions in which a response 1 means higher usability than response 5) need to be calculated to analyse this questionnaire. Those questions have marked in the mentioned annex with an asterisk. Additionally, as half of the questions in the long questionnaire are redundant, i.e., were added for validation purposes, once each question has been checked for validity, only half of the questions need to be analysed. Validity is checked by observing whether the responses to the pairs of questions (direct and inverse) are consistent. Note, however, that although they are designed to gather the same sort of information, these pairs of questions are not exactly the same and, therefore, the responses will not necessarily give the exact same numerical value. Nevertheless, the numerical values should be consistent. For example, the response of user 1 from Germanos to question 10 (Do you usually get confused and press an icon or menu thinking that it does something different to what the application really does?) was 2 (which is equivalent to a numerical value of 4, as the question was formulated negatively). On the other hand, the same user's response to the respective validation question, question number 43 (Are the names of the tasks listed in the menus meaningful?) was a numerical value of 3, which is consistent with the rating 4 for question 10. When the responses to the pairs of questions of each user were found not to be consistent, the respective pair was removed from the analysis so as to reduce noise.

Additionally, this questionnaire has been analysed by looking at both usability values assigned by users to the complementary questions with the idea of including as much information as possible. This has yielded two usability values, one including the positive responses to the complementary questions and another with the negative responses to the complementary questions.

Finally, Figure 1 shows the minimum and maximum usability ratings for the long questionnaire users. These values range from 2.88 to 3.55, and the mean is 3.22.

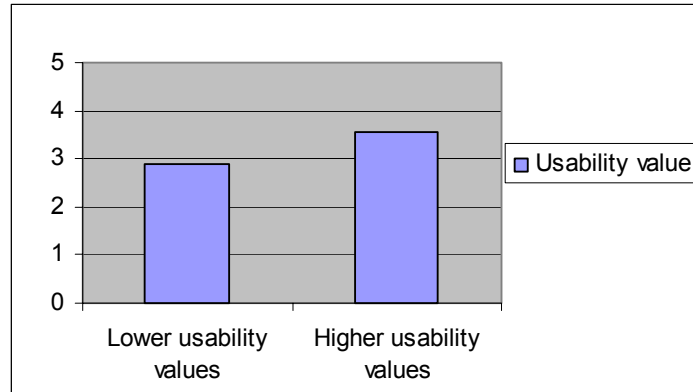


Figure 1. Usability values for long questionnaire

2.2 Results of the Short Questionnaire

Twelve users from LogicDIS, Friesland and Germanos completed the short questionnaire. In this case, LogicDIS members of STATUS worked without the UPM help to pass the questionnaires as they already had learned how to proceed with the evaluation of the long questionnaires. Table 2, Table 3 and Table 4, respectively, show the characteristics of these users.

Characteristic	Range	Num of users
Domain knowledge	Unknowledgeable: under one year working in the domain	4
	Fairly knowledgeable: from one up to two years working in the domain	0
	Expert: over two years working in the domain	0
Experience in computer use	Novice: under six months	0
	Fairly experienced: from six months up to one year	0
	Very experienced: from one year up to two years	0
	Expert: over two years	4
Knowledge of system under evaluation	Novice: under three months	4
	Expert: over three months	0

Table 2. Characteristics of LogicDIS users for short questionnaire

Characteristic	Range	Num of users
Domain knowledge	Unknowledgeable: under one year working in the domain	0
	Fairly knowledgeable: from one up to two years working in the domain	3
	Expert: over two years working in the domain	0
Experience in computer use	Novice: under six months	0
	Fairly experienced: from six months up to one year	0
	Very experienced: from one year up to two years	1
	Expert: over two years	2
Knowledge of system under evaluation	Novice: under three months	0
	Expert: over three months	3

Table 3. Characteristics of Friesland users for the short questionnaire

Characteristic of the users	Possible ranges for each characteristic	Num of users
Domain knowledge	Unknowledgeable: under one year working in the domain	0
	Fairly knowledgeable: from one up to two years working in the domain	5
	Expert: over two years working in the domain	0
Experience in computer use	Novice: under six months	0
	Fairly experienced: from six months up to one year	1
	Very experienced: from one year up to two years	1
	Expert: over two years	3
Knowledge of system under evaluation	Novice: under three months	0
	Expert: over three months	5

Table 4. Characteristics of Germanos users for short questionnaire

Note how LogicDIS users have no knowledge about the domain and about the system under evaluation, while both Germanos and Friesland users are fairly knowledgeable about domain and have worked with system for more than three months. These results are coherent, as the LogicDIS users were not the same members of the company who developed e-Suite.

LogicDIS collected the answers to the short questionnaires from the different users, and sent them to UPM to compile them perform the corresponding analysis. Annex D shows the answers for each

question of the short questionnaire for each of the user involved. Similarly to the long questionnaire, the complementary value has been used for those questions presented in negative way (that is, those ones in which an answer 1 provides means higher usability than an answer 5). Those questions have been marked with an asterisk in Annex D:

Figure 2 shows the mean usability values for the three user groups (2.9, 2.84 and 2.45). Note that the values for LogicDIS and Friesland are similar, whereas the Germanos ratings are lower. The average for all three is 2.73. Difference about LogicDIS/Friesland and Germanos can be due to that the first customer who ordered eSuite was Friesland therefore the product was tailor made to their specific requirements, then LogicDIS sold the product to Germanos. So, it is quite natural that Friesland (and LogicDIS users) feel more happy and more comfortable with eSuite than Germanos. It might also be natural that LogicDIS users provided the better usability values as having in mind that is a product developed by their colleagues they are supposed to be more benevolent.

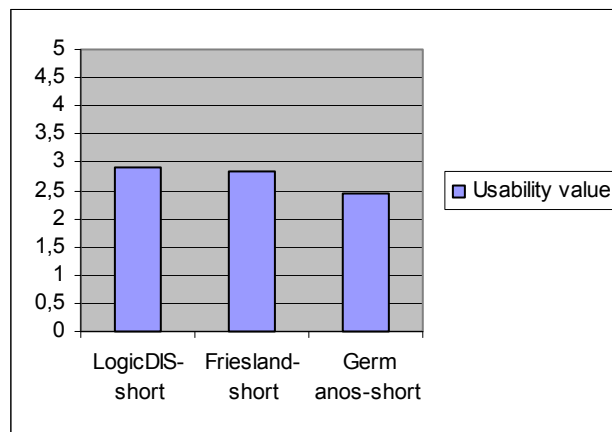


Figure 2. Usability values derived from the short questionnaire

2.3 Resulting Usability Value for Old Version of e-Suite

A usability value for the old version of e-Suite can be calculated by averaging the usability values collected from each questionnaire. Figure 3 illustrates these values, where the average is 2.85, a value that we will take to be representative of the usability of the old version of e-Suite. Notice that this value is close to the mean general usability value 3 in the range from 0 to 5 (range of the answers to the questionnaire).

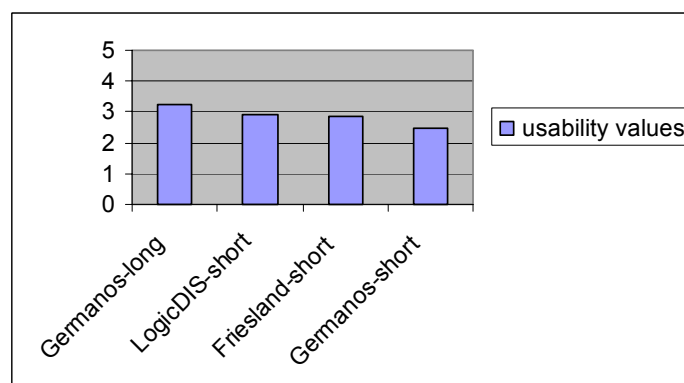


Figure 3. Mean usability values for old e-Suite

3. USABILITY EVALUATION OF NEW VERSION OF E-SUITE

Eight users from Germanos and Friesland were interviewed about the new version of e-Suite. LogicDIS was in charge of this interviewing process. This new version was developed according to the description presented in Deliverable 6.2. “Development Document of Pilot Project by LogicDIS” following the STATUS results. In this case only the short usability questionnaires were used. The questionnaires used for the evaluation of the new e-Suite were the same than the ones used for the usability evaluation of the old version, that is, the questionnaires of Annex B: This needs to be done in that way in order to get comparable results). The users were also the same that worked with the old version, except user 5 from Germanos that for the new version evaluation was replaced by a new employee.

UPM compiled and analysed the answers to the questionnaires gathered by LogicDIS. Annex E: shows the answers of those users for the short questionnaire applied to the new e-Suite. Notice that as was explained in section 2, we have worked with the complementary value of the answers of questions formulated in negative way.

Figure 4 shows the resulting usability values for the users of the two companies implicated in the study (Friesland and Germanos). Notice that, in this case, we cannot appreciate such a big difference between the usability of each kind of users (3.48 for Friesland) and 3.34 (for Germanos) as we found in the usability questionnaires of the old version. One possible reason for this similarity might be that Germanos’ users recommendations were already had in mind in the development of the new version of e-Suite, while they did not participated in the development of the old version.

According to Figure 4 the resultant usability value of the new version of e-Suite is 3.41.

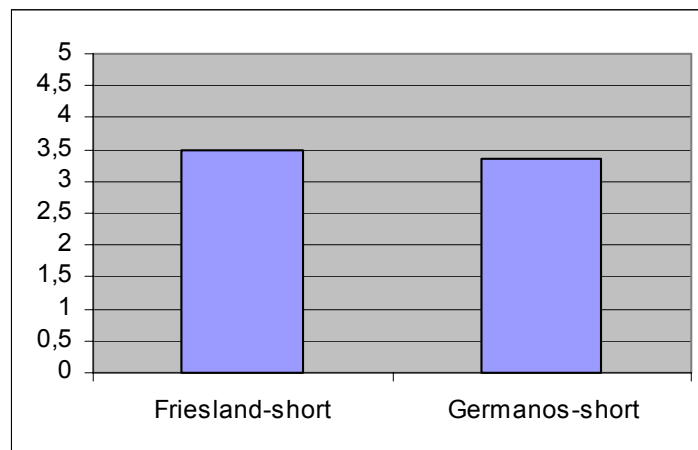


Figure 4. Mean usability values for new e-Suite

4. COMPARISON AND DISCUSSION OF USABILITY RESULTS FOR E-SUITE

Table 5 shows a comparison between the mean answers of the users that evaluated the old version of e-Suite and the users that evaluated the new version. **We can appreciate an improvement in the usability of all the questions except question 9 related to the feedback mechanisms.** In bold we have shown the questions related to the usability patterns introduced in the new version of e-Suite as consequence of STATUS results, and detailed in D.6.2. Notice how such questions present an interesting improvement. Notice also the high new value from question 10, that might represent the user general impression of the application. Clearly, the improvement of particular usability issues also improves this general view of the product.

It is interesting to discuss question 9 related to the feedback mechanisms. When LogicDIS was discussing the inclusion of the different usability patterns the reason for not incorporating feedback was the technical difficulties derived from incorporating this mechanisms due to the use of applets (which would downgrade performance a lot as the client would have to ask the server every 1-2 seconds if the server had finished processing and this would cause big network delays). Therefore, in this case, the trade-off between usability and efficiency was won by efficiency. This decision has had an expected impact in usability as shown by the answers to question 9. The reason of the difference between the answers in the old and the new application might be due to the fact that now that the users have seen improvements in the usability they have become more “greedy” and are asking for even more. One actual reaction from a user was “I thought you could not perform undo. Is it so difficult to also have a progress bar on the screen while we are waiting?”

Nº	Short Questionnaire Question	Mean answer of old version	Mean answer of new version
1	Is the help provided by the system suited for understanding what system options to select?	3.17	3.8
2	Do you think that the context sensitive help that the system provides about the icons is enough to help you work with the application?	3.3	3.77
3	Does the system easily provide the option of undoing the effect of any action once it has been taken? For example, suppose you change the quantity you want to order from an item, and then you want to return to the defect quantity.	1.48	4.2
4	Do you find enough the different searching criteria that the system provide?	2.53	3.3
5	Would you like the system to provide a better help that would explicitly take you through the key task performance?	1.97	3.27
6	Do you think the system should provide a better tour of key task performance?	2.26	3.7
7	Do you think it would be useful for the system to provide better access to the tasks using both the menu and keys or commands that shorten and/or rule out menu search?	2.05	2.77
8	Do you think that the system should provide a better differentiation operating options for experienced and for novice application users?	2.14	2.60
9	Do you think the system should give you more information than it does	3.26	2.67

	while it is running an operation and you are waiting for the response?		
10	Do you find it easy and intuitive to move around the system?	3.33	4
11	Are the system responses, for example, to confirm actions or request information, easily understandable?	3.68	3.83
	<i>MEAN USABILITY FOR SHORT QUESTIONS</i>	<i>2.73</i>	<i>3.41</i>

Table 5. Comparisson of answers to the short questionnaire for the old and the new e-Suite versions.

As was discussed in section 2.3, thel mean usability value for the old e-Suite was 2.85, considering the answers to the long usability questionnaire. Figure 5 shows the mean usability values for the old and new e-suite versions. Notice how an improvement almost 25% in usability has been produced from the old to the new existing version.

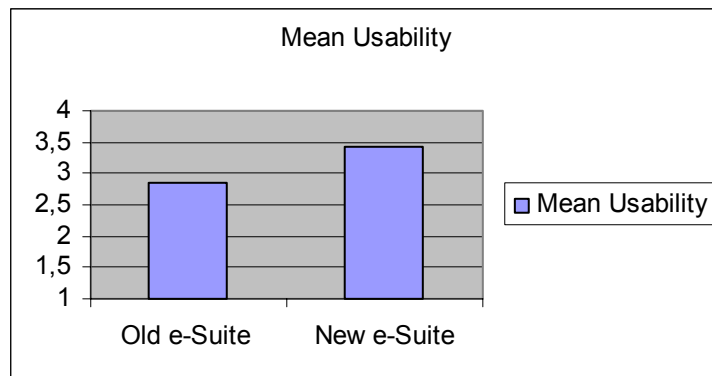


Figure 5. Mean Usability of old and new e-Suite

5. DISCUSSION OF THE USABILITY IMPROVEMENTS ACHIEVED AFTER APPLYING STATUS RESULTS

WP 6 was formulated with the intention of applying STATUS results and check the usability benefits derived from them. For that aim, LogicDIS worked on its existing e-Suite application (described in detail in the Usability Evaluation Plan document), developing a new version with the same functionality. This new version was built as explained in D.6.2., using STATUS research results, provided by the different university partners. In particular, during the requirements elicitation process the tool provided by the IC (described in detail D.3.3) was used in conjunction with the usability tests provided by UPM (detailed and justified in the Usability Evaluation Plan). With this information usability mechanisms were detected for their inclusion in the new version of e-Suite according to the suggestions of the different e-Suite users.

During the design process, LogicDIS applied the usability patterns (developed by UPM in D.3.4.) corresponding to the usability mechanisms identified during the requirements process. The usability mechanisms incorporated in the new e-Suite were:

- History Login (it was improved with respect to the way it was provided in the original version)
- Undo
- Provision of Views
- Shortcuts (it was improved with respect to the way it was provided in the original version)
- Context-Sensitive Help

On the other hand, RuG applied the scenario based assessment technique (described in D.3.1 and D.3.2.) to the resulting design in order to assess the potential usability of the resultant application. Besides the incorporation of these specific usability results in the new version of e-Suite, it might also be interesting to notice the possible impact that the general usability knowledge gained by LogicDIS developers due to their participation in the STATUS project for almost three years might have had on the development of the new version of e-Suite.

Finally, the resultant application was assessed to get a measure of its usability and compare it with the usability of the original application. This deliverable D.6.3. has shown this comparison and we have seen how an improvement of almost 25% has been produced in the usability of the resultant application. This increment in usability is quite relevant what has led us to identify the usability improvements derived from STATUS results.

Annex A: LONG QUESTIONNAIRE FOR E-SUITE

User Name:

Organization:

Date:

Please mark in this table your characteristics:

Characteristic	Range	
Domain knowledge	Unknowledgeable: under one year working in the domain	
	Fairly knowledgeable: from one up to two years working in the domain	
	Expert: over two years working in the domain	
Experience in computer use	Novice: under six months	
	Fairly experienced: from six months up to one year	
	Very experienced: from one year up to two years	
	Expert: over two years	
Knowledge of system under evaluation	Novice: under three months	
	Expert: over three months	

If you have been using the system for a long time, you will probably have got used to it and find it straightforward to use. However, when you answer these questions, try to remember what it was like when you first had to use the system, what problems you came up against, etc.

Please, answer the following questions marking the respective number. Please feel free to make any further comments you would like to about each question.

1. Do you find it *easy* to request the system to execute its routine tasks (e.g., search a model, output the model performance table, etc.)?

1 2 3 4 5
 Very easy Very difficult

Comments

2. Do you find it *complicated* to understand the meaning of the menus because of the language the application uses (English)?

1 2 3 4 5
Very complicated Very straightforward

Comments

3. Does the system easily provide the option of undoing the effect of any action once it has been taken? For example, suppose you change the quantity you want to order from an item, and then you want to return to the defect quantity.

4. Is the help provided by the system *suited* for understanding what system options to select?

1 2 3 4 5
Very adequate Not at all adequate

Comments

5. Would you like the system to provide a better help that would explicitly take you through the key task performance?

1 5
No Yes

Comments

6. Do you think the system *should* provide a tour of key task performance?

1 5
No Yes

Comments

7. Do you think it would be *useful* for the system to provide access to the tasks using both the menu and keys or commands that shorten and/or rule out menu search?

1 2 3 4 5
No Always

Comments

8. Is the system operated in the same way irrespective of whether it is used by an experienced or novice user?

1 2 3 4 5
No, depends on the task Always

Comments

9. Do you find it *easy and intuitive* to move around the system?

1 2 3 4 5
Not very intuitive Very intuitive

Comments

10. Do you usually get *confused* and press an icon or menu thinking that it does something different to what the application really does?

1 2 3 4 5
Not very confused Very confused

Comments

11. Do you find system operation *predictable*?

1 2 3 4 5
Not very predictable Very predictable

Comments

12. Do you think you spend *too much* time accessing the help to find out what the application icons and menus do?

1 2 3 4 5
Not much time A lot of time

Comments

13. Do you think the system *should give you more* information than it does while it is running an operation and you are waiting for the response?

1 2 3 4 5
Not much more..... Yes, a lot more

Comments

14. Do you *like* the fonts and font size used in the application?

1 2 3 4 5
They should be changed I like them

Comments

15. Do you think that the colours used in the application are *adequate*?

1 2 3 4 5
They should be changed..... I like them

Comments

16. Do you find it *difficult* to understand the system response, for example, when it confirms operation execution?

1 2 3 4 5
Very difficult Not very difficult

Comments

17. Do you *have problems* understanding the system response, for example, when requesting information or other indications because of the language used in the application?

1 2 3 4 5
I understand I don't understand

Comments

18. Are the system responses, for example, to confirm actions or request information, *easily understandable*?

1 2 3 4 5
Not understandable Understandable

Comments

19. Do you find the execution of similar tasks in the system intuitive?

1 2 3 4 5
Not very intuitive Very intuitive

Comments

20. The preparation of an "Order entry" for different products involve *similar* actions?

1 2 3 4 5
Not very similar Very similar

Comments

21. The preparation of an “Order entry” for different products involve *similar* screens?

1 2 3 4 5
Not very similar Very similar

Comments

22. Does the *lack* of system clarity cause you to make mistakes when performing a task?

1 2 3 4 5
Not many mistakes A lot of mistakes

Comments

23. Do you think you consult the help too often to try to remedy the mistakes you have made?

1 2 3 4 5
Very often Not very often

Comments

24. Do you have easy access to screens that provide previews?

1 2 3 4 5
No, none Yes, and easily

Comments

25. Does the application permit you to cancel any action while it is being executed?

1 2 3 4 5
No Yes, all actions

Comments

26. When the system requests data, does it check the data format and other characteristics to prevent incorrect data entry?

1 2 3 4 5
No Yes, all actions

Comments

Comments

33. Does the system help provide information to remedy the mistakes you have made?

1 2 3 4 5
Never Always

Comments

34. Can you access the system using any other procedure than the classical computer keyboard or mouse?

1 5
No Yes

Comments

35. Do you find the system difficult to use?

1 2 3 4 5
Not very difficult Very difficult

Comments

36. Can you work the system using your own language (other than English)?

1 2 3 4 5
Never Always

Comments

37. Do you find it complicated to find the information you require to use the system in the help?

1 2 3 4 5
No Always

Comments

38. Would you like the system to provide a help that would explicitly take you through the key task performance?

1 5

No Yes

Comments

39. Do you think the system should provide a tour of key task performance?

1 5
No Yes

Comments

40. Do you think it would be useful for the system to provide access to the tasks using both the menu and keys or commands that shorten and/or rule out menu search?

1 2 3 4 5
No Always

Comments

41. Is the system operated in the same way irrespective of whether it is used by an experienced or novice user?

1 2 3 4 5
No, depends on the task Always

Comments

42. Do you ever get lost from one application screen to another?

1 2 3 4 5
Never Always

Comments

43. Are the names of the tasks listed in the menus meaningful?

1 2 3 4 5
Not very representative Very representative

Comments

44. Are the application icons representative of their associated actions?

1 2 3 4 5

Not very representative Very representative

Comments

45. Does the system take actions the reason for which you do not understand?

1 2 3 4 5
Never Always

Comments

46. Is the meaning of the application menus so clear that you hardly ever have to use the help to understand them?

1 2 3 4 5
I use the help a lot I do not use the help much

Comments

47. When you execute a task, for example, “Deletion of a selected line”, does the system report what it is doing, for example?

Comments

1 2 3 4 5
No, for no tasks Yes, for all tasks

Comments

48. Do you think the font and font size used in the application should be improved?

1 2 3 4 5
No, I like them as they are Yes, they should be improved

Comments

49. Would you like to have the colours used in the application changed?

1 2 3 4 5
No, I like them as they are Yes, they should be changed

Comments

50. Do you usually quickly understand the system responses, e.g., when requesting information?

1 2 3 4 5
I never understand I always understand

Comments

51. Does the system sometimes communicate using terms that you don't understand very well?

1 2 3 4 5
I always understand I never understand

Comments

52. Does the system operate very differently to perform similar tasks?

1 2 3 4 5
No, system operation is the same Yes, system operation is always different

Comments

53. Are the system screens all very different although they display similar data?

1 2 3 4 5
No, the screens are the same, Yes, they are always different

Comments

54. Do you think that the number of errors you make when executing the tasks is reasonable?

1 2 3 4 5
No, I make a lot of errors Yes, I do not make many errors

Comments

55. Do you find it easy to recover the system from the errors you make?

1 2 3 4 5
No, it is very complex Yes, it is very easy

Comments

56. Do you think the system should provide previews before confirming task performance for error prevention?

1 2 3 4 5
No, never Yes, always

Comments

57. Do you often find that you *are unable* to cancel a system request when you realise you have made a mistake?

1 2 3 4 5
No, never Yes, always

Comments

58. Do you think the system should validate the data you enter to correct small errata more often?

1 2 3 4 5
No, never Yes, always

Comments

59. Do you think the system should provide information other than what it does to help you to find out what has happened when you have made a mistake?

1 2 3 4 5
No, the information is correct Yes, the information is deficient

Comments

60. Do you think the system should record the last few actions taken for retrieval in the event of system error?

1 2 3 4 5
No, never Yes, always

Comments

61. Do you think that the error messages provided by the system are of little help in detecting the mistake you make?

1 2 3 4 5
No, they are always helpful.....Yes, they are almost never helpful

Comments

- *Do you find the application easy to use?*
- *Do you remember whether it took you a long time to learn to use the application?*
- *When you have not used the application for some time, for example, because you have been away on holiday, do you find it difficult to remember how to use it?*
- *Do you think you make too many mistakes when executing system tasks?*
- *Is there any task that you think takes too long to do (search a model, get model performance tables, get model performance graphs, get model safety area, change model refrigerant, get catalogue sheet, print catalogue sheet, preview catalogue)?*
- *What were the main problems you came up against when using the application?*
- *What are the best features of the application?*
- *Which task (search a model, get model performance tables, get model performance graphs, get model safety area, change model refrigerant, get catalogue sheet, print catalogue sheet, preview catalogue) did you find it most difficult to do?*

Annex B: SHORT QUESTIONNAIRE FOR *ESUITE*

User Name:

Organization:

Date:

Please mark in this table your characteristics:

Characteristic	Range	
Domain knowledge	Unknowledgeable: under one year working in the domain	
	Fairly knowledgeable: from one up to two years working in the domain	
	Expert: over two years working in the domain	
Experience in computer use	Novice: under six months	
	Fairly experienced: from six months up to one year	
	Very experienced: from one year up to two years	
	Expert: over two years	
Knowledge of system evaluation under	Novice: under three months	
	Expert: over three months	

If you have been using the system for a long time, you will probably have got used to it and find it straightforward to use. However, when you answer these questions, try to remember what it was like when you first had to use the system, what problems you came up against, etc.

Please, answer the following questions marking the respective number. Please feel free to make any further comments you would like to about each question.

1. Is the help provided by the system *suited* for understanding what system options to select?

1 2 3 4 5
 Very adequate Not at all adequate

Comments

2. Do you think that the context sensitive help that the system provide about the icons is enough to help you work with the application?

1 2 3 4 5
Very adequate Not at all adequate

3. Does the system easily *provide* the option of undoing the effect of any action once it has been taken? For example, suppose you change the quantity you want to order from an item, and then you want to return to the defect quantity.

1 2 3 4 5
Never Always

4. Do you find enough the different searching criteria that the system provide?

1 5
Yes No

Comments

5. Would you like the system to provide a better help that would explicitly take you through the key task performance?

1 5
No Yes

Comments

6. Do you think the system should provide a tour of key task performance?

1 5
No Yes

Comments

7. Do you think it would be useful for the system to provide access to the tasks using both the menu and keys or commands that shorten and/or rule out menu search?

1 2 3 4 5
No Always

Comments

8. Would you find interesting that the system provide different operating options for experienced and for novice application users?

1 2 3 4 5
Not very interesting Very interesting

Comments

9. Do you think the system should give you more information than it does while it is running an operation and you are waiting for the response?

1 2 3 4 5
Not much more.....Yes, a lot more

Comments

10. Do you find it easy and intuitive to move around the system?

1 2 3 4 5
Not very intuitive Very intuitive

Comments

11. Are the system responses, for example, to confirm actions or request information, easily understandable?

1 2 3 4 5
Not understandable Understandable

Comments

Annex C: RESULTS OF THE LONG QUESTIONNAIRE FOR OLD eSUITE

	Lower usability values					2,884375	Higher usability values					3,55989583
Question	User 1	User 2	User 3	User 4	User 5	Mean ans	User 1	User 2	User 3	User 4	User 5	Mean answer
1. Do you find it <i>easy</i> to request the system to execute its routine tasks (e.g., search a model, output the	3	4	3	3	2	3	5	4	3	4	3	3,8
2. Do you find it <i>complicated</i> to understand the meaning of the menus because of the language the	4	3	4	incoherent 3	4	3,75	5	5	5	inconsistent 5	5	5
3*. Is the help provided by the system <i>suited</i> for understanding what system	1	1	1	1	incoherent 4	1	1	2	2	2	incoherent 1	1,75
38. Would you like the system to provide a better help that would <i>explicitly take you through the how</i>	1	1	1	1	3	1,4	1	1	1	1	3	1,4
39. Do you think the system should provide a better tour of key task	no answer	no answer	3	1	3	2,333333	no answer	no answer	3	1	3	2,33333333
40. Do you think it would be useful for the system to provide better access to the tasks using both the menu and keys or commands that shorten and/or <i>take out many steps?</i>	2	2	3	3	3	2,6	2	3	3	3	3	2,8
8. Do you think that the system should provide a better differentiation operating options for experienced and <i>for novice application users?</i>	1	1	1	1	1	1	1	1	1	1	1	1
9. Do you find it <i>easy and intuitive</i> to move around the system?	3	2	2	2	5	2,8	5	5	4	4	5	4,6
10*. Do you usually get <i>confused</i> and press an icon or menu thinking that it does something different to what the application really does?	3	4	3	3	3	3,2	4	4	4	4	4	4
11. Do you find system operation <i>predictable</i> ?	4	incoherent 2	2	3	3	3	5	incoherent 5	3	3	3	3,5
12*. Do you think you spend <i>too much</i> time accessing the help to find out what the application icons and	5	5	5	5	4	4,8	5	5	5	5	5	5
13*. Do you think the system <i>should give you more</i> information than it does while it is running an operation and you are waiting for the response?	4	4	4	incoherent 2	3	3,75	4	4	4	incoherent 5	3	3,75
14. Do you <i>like</i> the fonts and font size used in the application?	4	4	4	4	2	3,6	5	4	5	4	3	4,2
15. Do you think that the colours used in the application are <i>adequate</i> ?	incoherent 3	3	4	4	3	3,5	incoherent 5	4	4	4	3	3,75
16. Do you find it <i>difficult</i> to understand the system response, for example, when it confirms operation	5	4	4	inconsistent 2	3	4	5	4	4	4	4	4,25
17*. Do you <i>have problems</i> understanding the system response, for example, when requesting information or other indications because of the language used in the <i>application?</i>	5	5	4	5	4	4,6	5	5	4	5	4	4,6
18. Are the system responses, for example, to confirm actions or request information, <i>easily</i>	3	4	2	3	2	2,8	5	5	3	3	3	3,8
19. Do you find the execution of similar tasks in the system <i>intuitive</i> ?	4	incoherent 2	4	4	4	4	4	incoherent 5	5	5	5	4,75

15. Do you think that the colours used in the application are <i>adequate</i> ?	incoherent 3	3	4	4	3	3.5	incoherent 5	4	4	4	3	3.75
16. Do you find it <i>difficult</i> to understand the system response, for example, when it confirms operation	5	4	4	inconsistent 2	3	4	5	4	4	incoherent 4	4	4.25
17*. Do you <i>have problems</i> understanding the system response, for example, when requesting information or other indications because of the language used in the application?	5	5	4	5	4	4.6	5	5	4	5	4	4.6
18. Are the system responses, for example, to confirm actions or request information, <i>easily</i> understood?	3	4	2	3	2	2.8	5	5	3	3	3	3.8
19. Do you find the execution of similar tasks in the system intuitive?	4	incoherent 2	4	4	4	4	4	5	incoherent 5	5	5	4.75
20. The preparation of an "Order entry" for different products involve <i>similar</i> actions?	5	5	4	5	3	4.4	5	5	5	5	5	5
21. The preparation of an "Order entry" for different products involve <i>similar</i> screens?	3	3	4	5	3	3.6	5	5	5	5	5	5
22*. Does the <i>lack</i> of system clarity cause you to make mistakes when performing a task?	5	incoherent 2	4	3	4	4	5	4	incoherent 5	5	3	4.5
23. Do you think you consult the help <i>too often</i> to try to remedy the mistakes you have made?	5	4	4	2	4	3.8	5	5	5	5	5	5
24. Do you have <i>easy</i> access to screens that provide previews?	4	3	3	3	3	3.2	5	5	5	3	4	4.4
25*. Do you often find that you are unable to cancel a system request when you realise you have made a mistake?	2	2	1	4	2	2.2	2	2	4	4	2	2.5
26. When the system requests data, does it <i>check</i> the data format and other characteristics to prevent incorrect data entry?	4	incoherent 2	2	incoherent 2	3	3	5	4	incoherent 2	incoherent 5	4	3.6666667
27. Does the system <i>provide</i> the right information for you detect the mistakes you make?	incoherent 2	incoherent 2	2	inconsistent 3	2	2	incoherent 2	incoherent 5	incoherent 4	incoherent 3	incoherent 5	3
28*. Do you think the system should record the last few actions taken for retrieval in the event of system error?	1	1	4	1	1	1.6	2	3	4	1	1	2.2
29. Is the way in which the system explains the mistakes you have made <i>adequate</i> ?	incoherent 2	3	2	2	3	2.5	incoherent 2	4	3	3	4	3.5
30. Do you find it <i>difficult</i> to understand the system response, for example, error messages, because of the language used by the application?	3	4	incoherent 1	inconsistent 3	4	3.666667	4	5	incoherent 3	incoherent 5	5	4.6666667
31. Does the system <i>effectively</i> remedy the mistakes you make?	1	1	1	1	2	1.2	3	2	1	1	3	2
32. Does the system easily <i>provide</i> the option of undoing the effect of any action once it has been taken? For example, suppose you change the quantity you want to order from an	1	1	1	1	1	1	2	1	2	2	3	2
33. Does the system help provide information to remedy the mistakes you have made?	1	1	1	1	1	1	1	3	3	2	2	2.2

Annex D: RESULTS OF THE SHORT QUESTIONNAIRE FOR OLD ESUITE

	LogicDIS (no knowledge domain)				2,9090909	Friesland (fairly knowldeg)			2,848485	Germanos (fairly knowldege)					2,45455
Question	User 1	User 2	User 3	User 4	Mean answ	User 1	User 2	User 3	Mean answer	User 1	User 2	User 3	User 4	User 5	Mean answer
1*. Is the help provided by the system <i>suited</i> for understanding what system options to select?	4	4	5	4	4,25	4	2	2	2,666667	2	2	4	4	1	2,6
2*. Do you think that the context sensitive help that the system provides about the icons is enough to help you work with the	5	5	5	3	4,5	4	3	2	3	2	2	2	4	2	2,4
3. Does the system easily <i>provide</i> the option of undoing the effect of any action once it has been taken? For example	1	1	1	1	1	1	2	2	1,666667	1	1	2	3	2	1,8
4*. Do you find enough the different searching criteria that the system provide?	5	5	4	2	4	2	2	2	2	2	1	3	1	1	1,6
5*. Would you like the system to provide a better help that would explicitly take you through the key task performance?	1	3	3	2	2,25	1	3	1	1,666667	1	3	1	2	3	2
6*. Do you think the system should provide a better tour of key task performance?	3	1	1	3	2	3	3	3	3	1	3	3	1	1	1,8
7*. Do you think it would be useful for the system to provide better access to the tasks using both the menu and keys or commands that shorten and/or rule out menu search?	3	3	1	3	2,5	3	1	1	1,666667	2	2	2	2	2	2
8*. Do you think that the system should provide a better differentiatin operating options for experienced and for novice application users?	1	1	3	1	1,5	3	3	1	2,333333	3	3	1	3	3	2,6
9*. Do you think the system <i>should give you more</i> information than it does while it is running an operation and you are waiting for the response?	4	2	3	3	3	4	5	3	4	2	3	4	4	1	2,8
10. Do you find it <i>easy and intuitive</i> to move around the system?	4	3	2	2	2,75	4	3	4	3,666667	4	3	4	5	2	3,6
11. Are the system responses, for example, to confirm actions or request information, <i>easily</i> understandable?	5	4	4	4	4,25	3	3	3	3	4	3	4	5	3	3,8

Annex E: RESULTS OF THE SHORT QUESTIONNAIRE FOR NEW ESUITE

Question	Friesland (fairly knowledgeable)				Germanos (fairly knowledgeable, except user 5 novice)					Mean answer
	User 1	User 2	User 3	Mean answer	User 1	User 2	User 3	User 4	User 5	
1*. Is the help provided by the system <i>suited</i> for understanding what system options to select?	5	3	4	4	5	3	2	4	4	3,6
2*. Do you think that the context sensitive help that the system provides about the icons is enough to help you work with the	3	4	3	3,3333	4	3	4	5	5	4,2
3. Does the system easily provide the option of undoing the effect of any action once it has been taken? For example	3	5	4	4	5	5	3	4	5	4,4
4*. Do you find enough the different searching criteria that the system provide?	4	4	3	3,6667	4	4	2	2	3	3
5*. Would you like the system to provide a better help that would explicitly take you through the key task performance?	3	4	3	3,3333	3	4	3	3	3	3,2
6*. Do you think the system should provide a better tour of key task performance?	3	5	3	3,6667	3	5	5	3	3	3,8
7*. Do you think it would be useful for the system to provide better access to the tasks using both the menu and keys or commands that shorten and/or rule out menu search?	4	1	2	2,3333	2	3	2	2	3	2,4
8*. Do you think that the system should provide a better differentiation operating options for experienced and for novice application users?	3	3	3	3	3	3	1	3	1	2,2
9*. Do you think the system <i>should give you more</i> information than it does while it is running an operation and you are waiting for the response?	3	4	3	3,3333	1	3	3	1	2	2
10. Do you find it <i>easy and intuitive</i> to move around the system?	4	3	5	4	3	4	4	5	4	4
11. Are the system responses, for example, to confirm actions or request information, <i>easily</i> understandable?	4	4	3	3,6667	4	4	5	4	3	4