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# **Evaluation of Use Case Prototype**

Abstract:	
Туре	

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Version	Description	Contributors
1.0.0	First draft with overview	Emre Sevinç (SAS)
1.1.0	Added detailed task descriptions	Saliha Klaï (SAS)
		Emre Sevinç (SAS)
1.2.0	Added interview transcription and questionnaire results.	Emre Sevinç (SAS)
1.3.0	Added introduction and summary of the evaluation plan.	Emre Sevinç (SAS)
	Added the description of test users.	
1.4.0	Added the short SOVIM failure description.	Emre Sevinç (SAS)
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# **1** Introduction

This document provides the details of the evaluation of the Use Case Prototype of SAS. It starts with the description of two test users and then proceeds to the detailed description of the tasks to be conducted. Following that it describes, in summary, the approach taken to conduct the actual evaluation.

The final sections of the document include the answers to interview questions by the test users (that were recorded immediately after the evaluation took place), and the results of the questionnaires that were later filled in (offline) by the same test users.





# **2 Description of Test Users**

There have been two test users, as described in the following sections.

#### 2.1 Test User 1

Saliha Klaï is a certified SOLAR operator since the start of the SOLAR operations in 2008. She participates in operations throughout the mission, SOLAR in this case, working in shifts. Her background is in mathematics. Moreover she is the training responsible for the SOLAR Operations team, responsible for the in-depth qualification of the on console operators.

Prior to joining the SOLAR mission as an operator she had experience in system administration, research in meteorology for and execution of operations for the meteorological department for the air traffic service.

Her usual daily workflow at B.USOC (Belgian User Support and Operations Centre) includes activities such as continuous monitoring of the payload, activity scheduling and revision of schedules, communication (written and oral) with the Columbus Flight Control team, scientific teams, engineering teams and ESA support teams to ensure proper preparation and execution of the payload operations. Moreover, when an unexpected event happens, such as an anomaly impacting the on-going science measurements (e.g. AIB failure), she needs to do analyse the failure and recover the payload as soon as possible with the support of the ground teams under time constraints because loss of science needs to be mitigated.

#### 2.2 Test User 2

Carla Jacobs is a certified SOLAR operator since mid 2012. She participates in operations throughout the mission, SOLAR in this case, working both in shifts and offline. Her background is in solar physics.

Prior to joining the SOLAR mission as an operator she was working as a researcher at the University of Leuven, Belgium, in the department of Mathematics.

Her usual daily workflow at B.USOC (Belgian User Support and Operations Centre) includes activities such as time line reviews, preparing for operations of new and running missions, increment preparation, and operator training. Moreover, when an unexpected event happens, such as SOLAR system failure, she needs to coordinate and execute the trouble shooting and recovery activities under time constraints to minimise the impact on the SOLAR science operations.





# **3 Predefined Tasks**

In this chapter, the task performed by the test users, including (possible) steps in CUBIST to perform those tasks, are described.

## **3.1 Task 1 – Analyse the SOVIM Anomaly**

On 25th of October, 2008, at 04.28 AM, SOVIM (Solar Variations and Irradiance Monitor), one of the three critical instruments of SOLAR, broke down unexpectedly. The DC-DC converter powering SOVIM, stopped working.

In order to analyse the SOVIM anomaly, the user performs the following steps:

- When was the earliest occurrence of SOVIM power status (SOLAR\_PB3\_28V\_Out3) "ON" and SOVIM TM were halted or off nominal?
  - Select SOLAR\_PB3\_28V\_Out3 on, from 24-Oct 12.00 until 25 Oct 12.00 and choose several SOVIM TM (instruments).
- Find out whether there have been trip events before the failure.
  - Select the parameters typical of the anomaly and search for similar events in the whole DP.
  - List all occurrences of SOLAR\_PB3\_Outlet3\_Trip\_Stat being "ON" before the time of failure.
  - And finally show the TM generation of SOVIM in the weeks before the failure, to assess its stability (every second updates or halts in TM?) SOVIM only generated TM when being ON.
- What was the position of the SOLAR platform at the time of the failure?
  - Extract the value of SOLAR\_CPD\_Encoder\_Measure\_X and SOLAR\_CPD\_Encoder\_Measure\_Y at the time of failure.





#### **3.2 Task 2 – Retrieve SOLAR platform Sun Tracking Loop**

In order to retrieve SOLAR platform's Sun Tracking Loop, the user performs the following steps:

- Try to retrieve the Sun Tracking Cycle (PRE PNT, SUN ACQ, ST...) and the grouping of objects related to that (and the platform behaviour with regard to that). On track or not, the time prior to going to Sun ACQ).
  - Select "PL\_SubMode=PREPNT, SUNACQ, ST"
  - Visualize
  - Check whether you can see the 'Sun Observation cycle/orbit' respecting time
- Check whether the platform respects its requirements SSA\_X, SSA\_Y coordinates should be within [-250,250] when in ST
  - Search for variables PL\_Ops Mode = PM, and PL\_Ops\_Submode = SUNACQ, PREPNT, ST, check all SSA\_Xand SSA\_Y
- Are there errors that occur only when SOLAR is Sun tracking?
  - $\circ$  retrieve the SOLAR PL Submode and the errors < 0
  - visualize through Hasse and check whether there is a correlation
  - Choose PL\_SubMode PM, and (" Error warning OFF\_NOM"), and all error codes
  - o Visualize





#### **3.3 Task 3 – Anomalies and error analysis**

- Statistical review of the errors occurring in the available period
  - Select where an error ("Error Warning Type") was issued, together with the error code ("Error Code")
  - Visualize all errors using the following representations:
    - Hasse diagram
    - Distribution
    - Matrix  $\rightarrow$  Are there correlation between errors?
- Correlation between errors and errors/platform TM/instrument TM/...
  - Select the error codes ("error Code") and the Platform PL Op mode (or other variables you can think of)
  - Visualize and see whether there are correlations





# **4** Summary of the Evaluation Plan

In this section we describe how we prepared our users and conducted the evaluation.

The fact that CUBIST is a research prototype utilizing non-traditional and sophisticated analysis methods such as Formal Concept Analysis, as well as visualization methods such as Hasse diagrams called for a careful preparation phase. Based on the evidence collected by SAP from previous trials, it was already obvious that taking a test user who had not been exposed to the system before, and requesting that she evaluates the system for the first time would not contribute to a meaningful result; it would be similar to taking a car driver and requesting her to evaluate the qualities of a brand new jet airliner.

In order to overcome the potential challenges that we might encounter during the actual evaluation, we have used written and multimedia material, in addition to face to face interaction: Our test users had ample time to read a short introductory text describing the CUBIST prototype, FCA and visualizations. Then they were motivated to watch the detailed introductory tutorial video at <a href="http://www.youtube.com/watch?v=Kuu756nr1\_I">http://www.youtube.com/watch?v=Kuu756nr1\_I</a> and following the video we arranged face to face interactive sessions in our offices so that our test users could directly ask their questions to more experienced users and software engineers while playing with the prototype at the same time.

The second step of the evaluation was to define the tasks to be conducted during the live evaluation sessions. We collaborated with our domain experts, namely the SOLAR operators, in order to prepare the tasks and paid attention to exercising various features of CUBIST prototype for the sake of having a balanced evaluation.

The evaluation sessions were conducted through a teleconferencing system provided by SAP (SAPConnect). The test users were physically located in the SAS office (Zaventem, Belgium) and after establishing the connection, we shared our full screen, so that not only the test user, but also SAP could see actions taken by the test user. During this session, which also included recording the video and voice, we employed the Think Aloud method: the test users described what she was trying to accomplish and what she was currently thinking, no interpretations or comments made by the observers at this stage.

Following the completion of predefined tasks using the CUBIST prototype, an interview followed immediately, this was also fully recorded. Predefined open ended questions were answered by the test user and this completed the major part of the evaluation. A short questionnaire was also sent to the test user to be filled in. Transcribing the interview and collecting the answers to the questionnaire, whose results can be seen in the following sections, completed the evaluation.



<Confidential>



# **5** Interview Questions and Answers

This section will list the interview questions as well as the answers given by two test users.

## 5.1 Test User 1

- Name: Saliha Klaï
- Use Case: SAS
- Profession: Operations Engineer & SOLAR Operator
- Age: Click here to enter text.
- Gender: Female
- Computer Usage per day in hour: 8
- Date of Test: 09/08/2013
- Location of Test: Brussels, Belgium
- Please rate your overall computer skills?

□ Very good (e.g. programming, security, data modeling ...).

 $\boxtimes$  Good (e.g. frequently using spreadsheet applications, advanced in office tools, analysis tools...)

□ Standard (e.g. surfing, e-mail and writing simple documents, but not much more).
 □ Bad.

#### **5.1.1** For the tasks as conducted:

1. Please shortly describe the tasks you conducted with CUBIST:

Please see the detailed task descriptions above.

What do you expect from a system to fulfill these tasks?

I would expect to easily retrieve data and perform searches on it.

- 2. Did the system offer you the right information to fulfill your analytical tasks?
  - If yes, what kind of information and system functionality provided did you find especially helpful?

Yes, especially easily searching data was very useful.

 If no, what was missing from your point of view (regarding data provided/visualization possibilities/ interaction possibilities) to derive the desired information?

Visualizing was difficult with lots of data points.





- 3. Did you discover new facts during your analysis tasks that you had not expected to discover at all before?
  - If yes, what kind of new facts did you discover that were most surprising for you? Actually I did discover something new: I assumed there would be some errors related to the pointing mode for example, and apparently it did not happen that month, which is very surprising.
  - o No.
- 4. If the tasks fulfilled are typical for your daily work, do you think the tool can enrich your daily work by offering new ways to analyze your data?
  - Yes, because

Yes, absolutely a lot, because we do a lot of telemetry data replay, this is manual. We also do a lot of reviewing the data and parameters, refreshing it for every second, trying to grab the portions we are interested in. CUBIST prototype renders this practical, hence absolutely useful.

#### 5.1.2 For more tasks:

- 5. Which analytical systems do you currently use in your daily work?
  - a. The tools are for example:
    - It is not really EXCEL or MATLAB; we write a lot of little, one off scripts, on a case by case basis.
  - b. None.
- 6. From your point of view ...
  - c. Please shortly describe what is missing in current systems to use them effectively for your daily tasks:

It is very individual. Each team member has her own way of working. It is unique for any team member. We always need to retrieve part of the data from our database, our archive, and it is always on a case by case basis, in other words, it is almost never reusable.

d. Do you think CUBIST fills an analytical gap or provides functionalities that better fit your analytical tasks? Why do you think so?Yes, the prototype lets you visualize what we're trying to analyze, to understand better what happened. This is something we do not have currently. Also the easy retrieval of special events is very important. Currently we need to go through the logs and this is not easy.





- 7. Next to the data/use case currently implemented in the system, do you see any content from your daily life (private and professional) to be integrated in the system in future? Skipped (does not apply to this use case).Why do you think this would be benefit? Skipped (does not apply to this use case).
- 8. For which kind of tasks from you daily work do you believe the system can be especially useful? Please describe the tasks and the possible benefit shortly:

Skipped (does not apply to this use case as the routine tasks on console consist of realtime monitor ing of House Keeping data, CUBIST is mostly beneficial for post-analysis which is not considered part of daily on console operations).

9. For which kind of tasks from your daily work do you believe the system is annoying / ineffective? Please describe the tasks and the possible drawbacks shortly: Skipped (does not apply to this use case as the routine tasks on console consist of real-time monitor ing of House Keeping data, CUBIST is mostly beneficial for post-analysis which is not considered part of daily on console operations).Comparing the different CUBIST means to access information

Which of CUBIST's analysis components did you find most valuable for your tasks and why?

• "Search and Select"-Panel

This was useful to select data. This and the Scale Selection Panel are considered as a single component for me. They are essential and very important, to have a meaningful set of data.

- Instance View This does not apply to this use case.
- "Explore Selection"-Panel This does not apply to this use case.
- "Scale Selection"-Panel This was useful, too (see above).
- "Analyze Selection"-Panel
- This was useful.
- Traditional Visualization (e.g. bar charts): This is not meaningful for our use case.
- Other Function:

This does not apply to this use case.

10. For each of the following components, what do you think for what kind of information need it is suited best (e.g. number analysis ...)?





o "Search and Select"-Panel

The most important thing is to be sure that the correct subset of data is selected. Otherwise having list view or table view does not make much difference for our case.

- "Navigate in Data"-Panel Skipped.
- "Explore Selection"-Panel Skipped.
- "Scale Selection"-Panel

This is extremely useful, especially for continuous data, to discretize them. I would also like to do manual binning for time values.

• "Analyse Selection"-Panel

I'm a big fan of Formal Concept Analysis, and the lattice visualization. Cross comparison is also great. I also find the filtering functionality useful but I think I need to play more with it to really understand how to manipulate everything. The distribution visualization does not seem very meaningful currently. I am really a fan of the Hasse diagram but others, such as Sunburst or Sankey are not very meaningful for me. Also the matrix visualization can be very useful.

Visualizations are useful for mapping of events, looking at events, second by second, to have a clear view of the event; and to find possibly correlation of parameters.

- Traditional Visualization (e.g. bar charts): Skipped.
- Other Function: Skipped.
- 11. How easy was it for you to choose the most appropriate analysis approach and visualization for your needs from the overall functionalities offered:
  - o Easy
  - Difficult

I found it from easy to difficult.

Because, I need more exercise with the CUBIST system to really know which one is the most appropriate.

12. What (functionalities and/or system in general) was the major drawback of CUBIST for you and why?

Its performance. I would like to play a lot with it, but you have to be very patient for that.





- 13. Do you think you understood how all the different means offered by CUBIST to access information interact? Comment if necessary.
  - e. Yes, I think I understood.
  - f. No, Click here to enter text.
- 14. How did you like the guidance offered by the system to navigate through the available information? Please comment your decision.
  - Very good guidance.

Because, it was very logical

- 15. Did you immediately understand how to read the visualizations and use the analysis functionalities in the tool?
  - Yes: If yes, can you describe what made it easy for you to understand the tool? Well, the lattice, I can read it, but the others not so easy.
  - No: If no, what made it difficult?
     For example, the matrix visualization is not easy to understand. You also need an introduction to Formal Concept Analysis.

#### 5.1.3 Disliked/Unneeded/Missing Features

In this part, we aim at finding out disliked, unneeded or missing features. We do this per component.

16. For each of the following components, which features do you dislike most? And Why?

- "Search and Select"-Panel Min and max values are already filled in but they are not actual minimum and maximum. This is confusing. List view is not really useful. Table view is better.
- "Navigate in Data"-Panel Skipped.
- "Explore Selection"-Panel Skipped.
- "Scale Selection"-Panel
   I just did not understand 'add property name' feature.
- "Analyse Selection"-Panel
   When you try to zoom sometimes the lattice disappears. It would be nice to have something like the 'Google hand' (like Google maps), so that I can 'grab' it.
- 17. For each of the following components, which features are not needed from your point of view?







- "Search and Select"-Panel List view.
- "Navigate in Data"-Panel Skipped.
- "Explore Selection"-Panel Skipped.
- "Scale Selection"-Panel
   Add property names: I have never used that. (I did not understand what it was. But now I understand better.)
- "Analyse Selection"-Panel
   Distribution is not needed, at least in the main window. I don't see the use of it.
- 18. And finally, each of the following components, which features missing?
  - "Search and Select"-Panel
     The possibility of having the actual minimum and maximum values is important.
  - "Navigate in Data"-Panel Skipped.
  - "Explore Selection"-Panel Skipped.
  - "Scale Selection"-Panel Manual binning for time values would be useful.
  - "Analyse Selection"-Panel
     Adding attributes to and removing attributes from the lattice would be great.

#### **5.1.4 Famous last words**

Do you have any more comments or remarks?

I wish I could play with CUBIST more before the evaluation.





#### 5.2 Test User 2

- Name: Carla Jacobs
- Use Case: SAS
- Age: 33
- Gender: Female
- Profession: Operations Engineer
- Computer Usage per day in hour: 8
- Date of Test: 27/08/2013
- Location of Test: Brussels, Belgium
- Please rate your overall computer skills?

 $\Box$  Very good (e.g. programming, security, data modeling, ...).

 $\boxtimes$  Good (e.g. frequently using spreadsheet applications, advanced in office tools, analysis tools,...)

□ Standard (e.g. surfing, e-mail and writing simple documents, but not much more).
 □ Bad.

#### **5.2.1** For the tasks as conducted

1. Please shortly describe the tasks you conducted with CUBIST:

Please see the detailed task descriptions above.

What do you expect from a system to fulfill these tasks?

Skipped.

- 2. Did the system offer you the right information to fulfill your analytical tasks?
  - a. If yes, what kind of information and system functionality provided did you find especially helpful?
    Overview of the data set and selecting functionality were very helpful and useful. The table view especially, e.g. for selecting specific time ranges and parameters, to narrow down the data set. For some of the tasks performed they were very helpful.
  - b. If no, what was missing from your point of view (regarding data provided/visualization possibilities/ interaction possibilities) to derive the desired information?
    There were lots of functionalities, features... not all of them were very useful for my use case.





- 3. Did you discover new facts during your analysis tasks that you had not expected to discover at all before?
  - a. If yes, what kind of new facts did you discover that were most surprising for you? Indeed, I discovered some strange things in the data set. Sometimes it was surprising. It was the first time I looked into this part of the data set. But you need to know the nature of the data so that it makes sense for you.
  - b. No.
- 4. If the tasks fulfilled are typical for your daily work, do you think the tool can enrich your daily work by offering new ways to analyze your data?
  - a. Yes, because

I think it has some potential, for sure. But it needs some improvements, or better, to rethink the whole concept to make it more suitable. Ours is a pretty complex data set.

- b. No, because Click here to enter text.
- c. Partly, because

#### 5.2.2 For more tasks:

- 5. Which analytical systems do you currently use in your daily work?
  - g. The tools are for example:

I don't have an example.

- 6. From your point of view ...
  - Please shortly describe what is missing in current systems to use them effectively for your daily tasks: Click here to enter text.
  - i. Do you think CUBIST fills an analytical gap or provides functionalities that better fit your analytical tasks? Why do you think so? Click here to enter text.
- 7. Next to the data/use case currently implemented in the system, do you see any content from your daily life (private and professional) to be integrated in the system in future? Skipped.

Why do you think this would be benefit? Skipped.





8. For which kind of tasks from you daily work do you believe the system can be especially useful? Please describe the tasks and the possible benefit shortly:

Skipped (does not apply to this use case as the routine tasks on console consist of realtime monitor ing of House Keeping data, CUBIST is mostly beneficial for postanalysis which is not considered part of daily on console operations)..

9. For which kind of tasks from your daily work do you believe the system is annoying / ineffective? Please describe the tasks and the possible drawbacks shortly:

Skipped (does not apply to this use case as the routine tasks on console consist of real-time monitor ing of House Keeping data, CUBIST is mostly beneficial for post-analysis which is not considered part of daily on console operations).

# 5.2.3 Comparing the different CUBIST means to access information

Which of CUBIST's analysis components did you find most valuable for your tasks and why?

- "Search and Select"-Panel This was very helpful, without this it is impossible to do anything else.
- Instance View Click here to enter text.
- "Explore Selection"-Panel Click here to enter text.
- "Scale Selection"-Panel This is also useful, but you might need more granular binning.
- "Analyse Selection"-Panel This is also useful; I liked the Filtering tool a lot. It lets you think by yourself and explore the results. Filtering is useful if you are really looking for particular case.
- Traditional Visualization (e.g. bar charts):
- Click here to enter text.
- Other Function: Click here to enter text.
- 10. For each of the following components, what do you think for what kind of information need it is suited best (e.g. number analysis, ...)?
  - "Search and Select"-Panel For analyzing error codes and numbers, seeing when it happened.
  - "Navigate in Data"-Panel Click here to enter text.
  - "Explore Selection"-Panel





Click here to enter text.

- "Scale Selection"-Panel For actually examining the data points. E.g. to see what the position of the instrument was during the SOVIM failure.
- "Analyse Selection"-Panel For visualizing the correlation of error codes with other events.
- Traditional Visualization (e.g. bar charts): Click here to enter text.
- Other Function: Click here to enter text.
- 11. How easy was it for you to choose the most appropriate analysis approach and visualization for your needs from the overall functionalities offered:

From easy to difficult. It is task dependent.

12. What (functionalities and/or system in general) was the major drawback of CUBIST for you and why?

The major drawback, apart from long waiting time, is lack of informative feedback. If the data set I selected is very large, it should warn me. Also I would like to jump to the end of my data set. Also it does not show the actual minimum and maximum values.

- 13. Do you think you understood how all the different means offered by CUBIST to access information interact? Comment if necessary.
  - Yes, but it depends on the nature of the subset of data you are trying to visualize. In the first task it was a little difficult but for the second task it was easier. You have to think beforehand what exactly you are trying to find out. This is a kind of expert tool.
  - o No,
- 14. How did you like the guidance offered by the system to navigate through the available information? Please comment your decision.
  - Good guidance

Because, it was very logical. But help function is poor. Some visualizations are not straightforward at all.

15. Did you immediately understand how to read the visualizations and use the analysis functionalities in the tool?

• Yes: If yes, can you describe what made it easy for you to understand the tool? Copyright © CUBIST Consortium 2010-2013 Page 19/31





Click here to enter text.

• No: If no, what made it difficult?

Due to labeling issues, it was not easy to distinguish between bins. If there are more than a few parameters, it can get quite complex. You also need to have some knowledge about Formal Concept Analysis. I have also looked at different visualizations, some of them are not easy to understand.

#### **5.2.4 Disliked/Unneeded/Missing Features**

In this part, we aim at finding out disliked, unneeded or missing features. We do this per component.

16. For each of the following components, which features do you dislike most? And Why?

- "Search and Select"-Panel
   There are not many things that I don't like in this component.
- "Navigate in Data"-Panel Click here to enter text.
- "Explore Selection"-Panel Click here to enter text.
- "Scale Selection"-Panel Click here to enter text.
- "Analyse Selection"-Panel Labeling was not clear. For timestamps, half of the label was missing.
- 17. For each of the following components, which features are not needed from your point of view?
  - "Search and Select"-Panel I don't see any unneeded features.
  - "Navigate in Data"-Panel Click here to enter text.
  - "Explore Selection"-Panel Click here to enter text.
  - "Scale Selection"-Panel
     Data table is not very meaningful, it might go to Search and Select.
  - "Analyse Selection"-Panel Right hand side visualizations are mostly not needed for me.
- 18. And finally, each of the following components, which features missing?
  - "Search and Select"-Panel





Jump to the end of the data. Automatic detection of actual minimum and maximum values. Seeing what parameters I have selected and the ones I did not select in two different columns might also be useful.

- "Navigate in Data"-Panel Click here to enter text.
- "Explore Selection"-Panel Click here to enter text.
- "Scale Selection"-Panel More granular binning. To see the selected the ranges.
- o "Analyse Selection"-Panel

Overview of ranges. Otherwise you have to remember by heart the actual beginning of those ranges. Splitting the main pane into basic and advanced would be also useful.

#### 5.2.5 Famous last words

Do you have any more comments or remarks?

I think it's a great initiative for data mining of large data sets. Although it is a prototype it seems to have a lot of potential, you should continue developing it.





# **6** The results of the questionnaire

This section will list the post evaluation questionnaire as well as the answers given by two test users.

#### 6.1 Test User 1

#### **6.1.1** For the overall prototype

The CUBIST software was easy to use and work with.	strongly agree     neutral     strongly disagree     n/a       Image:
Neglecting the currently prototypic character, I would like to use the CUBIST software in future again.	strongly neutral strongly n/a agree not n/a
In future, I would prefer CUBIST to other analytical tools I currently use.	strongly agree     neutral     strongly disagree     n/a       Image:
Using CUBIST software could make my work more effective and efficient.	strongly agree     neutral     strongly disagree     n/a       Image:
The integration of different components (used to access, explore and visualize information) was helpful for fulfilling my tasks.	strongly agree     neutral     strongly disagree     n/a       Image:
The different components and the visualizations in CUBIST are well integrated.	strongly agree     neutral     strongly disagree     n/a       Image:
It is clear how the different components interact.	strongly agree     neutral     strongly disagree     n/a       Image:
The navigation/interaction functionalities were easy to understand and apply.	strongly agree     neutral     strongly disagree     n/a       Image:
It was easy to follow the steps performed by the system when using the interaction functionalities.	strongly agree     neutral     strongly disagree     n/a       Image:





## 6.1.2 For the "Search and Select" Component

The purpose and function of the component is	strongly agree	neutral	strongly disagree	n/a
clear.				
The component is easy to understand and use.	strongly agree	strongly agree neutral		n/a
The interface is appealing and attractive.	strongly agree	neutral	strongly disagree	n/a
The component is useful.	strongly agree	neutral	strongly disagree	n/a
For some kinds of information needs or queries, particularly this component (or similar components based on the same approach) is useful.	strongly agree	neutral	strongly disagree	n/a
I have similar functionalities in the tools I usually use.	strongly agree	neutral	strongly disagree	n/a





## **6.1.3 For the "Navigate in Data"-Component**

The purpose and function of the component is		strongly agree	neutral	strongly disagree	n/a
clear.	[				$\boxtimes$
The component is easy to understand and use.		strongly agree	neutral	strongly disagree	n/a
	[				$\boxtimes$
The interface is appealing and attractive.		strongly agree	neutral	strongly disagree	n/a
	[				$\boxtimes$
The component is useful.		strongly agree	neutral	strongly disagree	n/a
	[				$\boxtimes$
For some kinds of information needs or queries, particularly this component (or similar components based on the same approach) is useful.	(	strongly agree	neutral	strongly disagree	n/a
I have similar functionalities in the tools I usually use.		strongly agree	neutral	strongly disagree	n/a





# **6.1.4 For the "Explore Selection" Component**

The purpose and function of the component is	strongly agree	neutral	strongly disagree	n/a
clear.				$\boxtimes$
The component is easy to understand and use.	strongly agree	eutral neutral		n/a
				$\boxtimes$
The interface is appealing and attractive.	strongly agree	neutral	strongly disagree	n/a
				$\boxtimes$
The component is useful.	strongly agree	neutral	strongly disagree	n/a
				$\boxtimes$
For some kinds of information needs or queries, particularly this component (or similar components based on the same approach) is useful.	strongly agree	neutral	strongly disagree	n/a
I have similar functionalities in the tools I usually use.	strongly agree	neutral	strongly disagree	n/a





# **6.1.5 For the "Analyse Selection"-Component**

The purpose and function of the component is clear.	strongly agree     neutral     strongly disagree     n/a       Image:
The component is easy to understand and use.	strongly agree     neutral     strongly disagree     n/a       Image: Image in the strong
The interface is appealing and attractive.	strongly agree     neutral     strongly disagree     n/a       Image: Image in the strong
The component is useful.	strongly agree     neutral     strongly disagree     n/a       Image:
For some kinds of information needs or queries, particularly this component (or similar components based on the same approach) is useful.	strongly neutral strongly n/a disagree n/a
I have similar functionalities in the tools I usually use.	strongly agree     neutral     strongly disagree     n/a       Image: Image in the strong
The visualizations were easy to understand.	strongly agree     neutral     strongly disagree     n/a       Image: Image in the strong
There are visualizations available that did fit my tasks very well.	strongly agree     neutral     strongly disagree     n/a       Image: Image im
The integration of different visualizations was helpful for fulfilling my task.	strongly agree     neutral     strongly disagree     n/a       Image:
It is clear how the different visualization interact.	strongly agree     neutral     strongly disagree     n/a       Image: Image in the strong



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#### 6.2 Test User 2

## **6.2.1** For the overall prototype

The CUBIST software was easy to use and work with.	strongly agree     neutral     strongly disagree     n/a       Image: Image of the strongly agree     Image of the strongly disagree     Image of the strongly disagree
Neglecting the currently prototypic character, I would like to use the CUBIST software in future again.	strongly neutral strongly n/a disagree n/a
In future, I would prefer CUBIST to other analytical tools I currently use.	strongly agree     neutral     strongly disagree     n/a       Image: Image of the strongly agree     Image of the strongly disagree     Image of the strongly disagree
Using CUBIST software could make my work more effective and efficient.	strongly agree     neutral     strongly disagree     n/a       Image:
The integration of different components (used to access, explore and visualize information) was helpful for fulfilling my tasks.	strongly agree     neutral     strongly disagree     n/a       Image:
The different components and the visualizations in CUBIST are well integrated.	strongly agreeneutralstrongly disagreen/aIIII
It is clear how the different components interact.	strongly agree     neutral     strongly disagree     n/a       ⊠     □     □     □
The navigation/interaction functionalities were easy to understand and apply.	strongly agreeneutralstrongly disagreen/aImage: Strongly disagreeImage: Strongly disagreeImage: Strongly n/a
It was easy to follow the steps performed by the system when using the interaction functionalities.	strongly agree     neutral     strongly disagree     n/a       Image:





## 6.2.2 For the "Search and Select" Component

The purpose and function of the component is		ongly gree	neu	tral	stroi disa		n/a
clear.	$\boxtimes$						
The component is easy to understand and use.		strongly agree neutral		stroi disa		n/a	
			$\boxtimes$				
The interface is appealing and attractive.		ongly gree	neu	tral	stroi disa	05	n/a
			$\boxtimes$				
The component is useful.		ongly gree	neu	tral	stroi disa	05	n/a
	$\boxtimes$						
For some kinds of information needs or queries, particularly this component (or similar components based on the same approach) is useful.		ongly gree	neu	tral	stroi disa	0.5	n/a
I have similar functionalities in the tools I usually use.		ongly gree		tral	stroi disa	05	n/a





## **6.2.3 For the "Navigate in Data"-Component**

The purpose and function of the component is		strongly agree	neutral	strongly disagree	n/a
clear.					$\boxtimes$
The component is easy to understand and use.		strongly agree	neutral	strongly disagree	n/a
	-				$\boxtimes$
The interface is appealing and attractive.		strongly agree	neutral	strongly disagree	n/a
					$\boxtimes$
The component is useful.		strongly agree	neutral	strongly disagree	n/a
					$\boxtimes$
For some kinds of information needs or queries, particularly this component (or similar components based on the same approach) is useful.		strongly agree	neutral	strongly disagree	n/a
I have similar functionalities in the tools I usually use.		strongly agree	neutral	strongly disagree	n/a
-					





# **6.2.4 For the "Explore Selection" Component**

The purpose and function of the component is	strongly neutral strongly n/a
clear.	
The component is easy to understand and use.	strongly neutral strongly n/a
The interface is appealing and attractive.	strongly neutral strongly n/a
The component is useful.	strongly neutral strongly n/a
For some kinds of information needs or queries, particularly this component (or similar components based on the same approach) is useful.	strongly neutral strongly n/a disagree n/a
I have similar functionalities in the tools I usually use.	strongly agreeneutralstrongly disagreen/aIIIII





## 6.2.5 For the "Analyse Selection"-Component

The purpose and function of the component is clear.	strongly neutral strongly agree disagree	n/a
The component is easy to understand and use.	strongly neutral strongly disagree	n/a
The interface is appealing and attractive.	strongly neutral strongly disagree	n/a
The component is useful.	strongly neutral strongly disagree	n/a
For some kinds of information needs or queries, particularly this component (or similar components based on the same approach) is useful.	strongly neutral strongly disagree	n/a
I have similar functionalities in the tools I usually use.	strongly   strongly     agree   neutral     Image: Image in the strongly     Image in the strongly <t< td=""><td>n/a</td></t<>	n/a
The visualizations were easy to understand.	strongly neutral strongly disagree	n/a
There are visualizations available that did fit my tasks very well.	strongly   strongly     agree   neutral     Strongly   disagree	n/a
The integration of different visualizations was helpful for fulfilling my task.	strongly neutral strongly disagree	n/a
It is clear how the different visualization interact.	strongly neutral strongly disagree	n/a