

Allosteric Inhibition of Galectin-3 Glycan Binding by Small Molecules Targeting the CRD F-Face

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ABSTRACT

This document presents the findings in the questionnaire with ten MSc students, during their internship programme at the KIT (Karlsruhe Institute of Technology). The study was based on a questionnaire which included System Usability Scale (SUS), a valid and reliable questionnaire widely used for user-perceived usability [5].

The results showed that the usability of the DARE platform is very close to the average score (which is 68). A number of suggestions for improvement were collected.

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1 INTRODUCTION

DARE is a large project that aims to provide novel approaches for creating and using data-driven methods to support research and innovation. DARE's central goal is to support domain researchers/research developers to integrate and use European e-infrastructures, research infrastructures and other platforms and software in order to create data- and computationally-intensive applications for their domains.

The intended users of the platform are:

- domain experts/researchers
- research developers
- software developers/computer scientists
- research software engineers

The study reported here is the first from a planned series aimed at evaluating the usability of the DARE platform.

2 DESCRIPTION OF THE STUDY

2.1 Aims

The aims of the study were to:

1. investigate the usability of the platform
2. collect suggestions for improving the platform

2.2 Participants

Ten international students from KIT's BSc and MSc programmes in Geophysics participated to this study. These students were participants in a course intended to train them in volcanic hazard assessment. After having simulated ash dispersal and settling at the computer, students went to Italy and performed field measurements at the locations of the simulations.

2.3 Methods

We used a questionnaire to capture the users' perception of usability (mainly user satisfaction) and also suggestions for improving the platform regarding both usability and functionality. The questionnaire included SUS which consists of five-point Likert scale questions [5]. The overall score is obtained by combining the ten scores for each question and it ranges from 0 to 100 (see Appendix A). Bangor et al. [1] proposed a set of acceptability

ranges and added an adjective rating scale to SUS to help in the interpretation of the SUS scores. The authors also suggested score ranges, such as ‘school scores’, e.g., B=80-89.

Figure 2.1 shows the mapping of the adjective ratings, acceptability scores, school grading scores and the overall SUS score. Although SUS scores range from 0 to 100, they are not a percentage. A score of 68 is in fact an average score. In order to be excellent, a product should score over 80.3. The recommendation is that the overall score and not the individual ones should be considered.

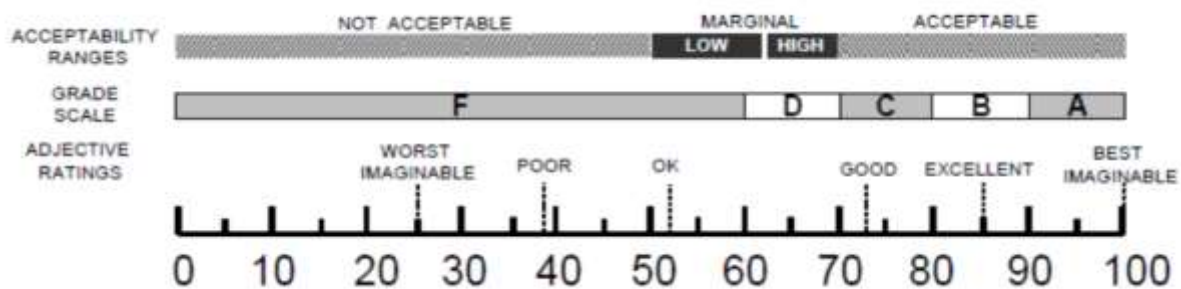


Figure 2.1: Comparative illustration of adjective ratings, acceptability scores, school scores and the overall SUS scores (after Bangor et al. 2009)

Besides the SUS questions we added three more questions to find out what features the users liked most and least and to collect suggestions for improving the platform (in usability and functionality).

2.4 Procedure

The study got ethical approval (No 34039) from the School of Informatics, University of Edinburgh, where the researchers who led this study work.

The materials used for this study included:

- an *information sheet* (see Appendix B)
- a *consent form* (see Appendix C)
- a *questionnaire* with 13 questions (SUS questionnaire included) (Appendix D)

The study took place at the KIT (Karlsruhe Institute of Technology) and followed up a session of student training which included using a free exploration of the DARE platform. After reading the information sheet and signing the consent form, the students received a hard copy of the questionnaire and were given time to answer it individually.

3 DATA COLLECTION AND ANALYSIS

The data collected consisted of the students' answers in the questionnaire (Appendix E). The data from the SUS questionnaire was analysed using the formula provided in Appendix A.

The data analysis was inspired by thematic analysis, the top-down approach. “Thematic analysis is a method for identifying, analysing, and reporting patterns (themes) within data.” [2, p. 82]. In the top-down approach the thematic analysis starts with pre-established themes. New themes and subthemes which are drawn from data could be added later.

More specifically, the analysis started with the following set of pre-defined themes: *likes* (containing features that students liked most), *challenges* (containing features that students liked least) and *suggestions*.

4 RESULTS AND DISCUSSION

After analysing the data, we excluded the data from one participant as we found that the scores in the SUS questionnaire were in contradiction with their answers in the open-ended questions. Particularly, the student was very positive in appreciating the platform, but scored the platform extremely low (i.e. 15). Therefore, we only considered the results from nine participants to this study.

4.1 SUS Scores on Usability

The SUS scores for the nine participants ranged between 50 and 82.5 (see Figure 4.1) with an average of 65.

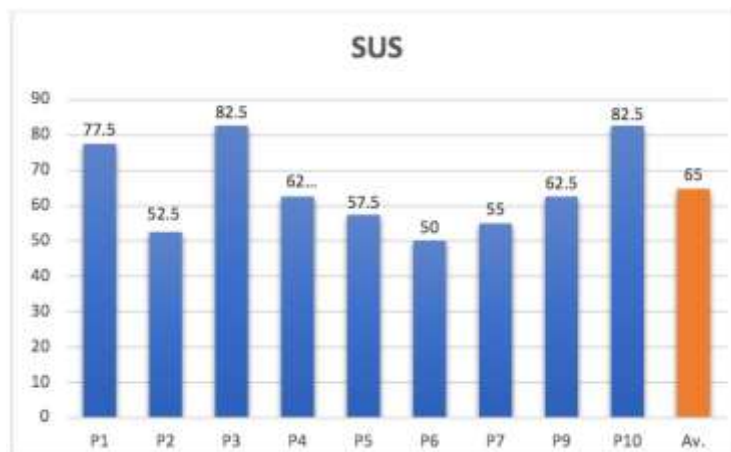


Figure 4.1: Scores in the SUS questionnaire

Looking at Figure 4.2, we can see that the maximum score is very close to excellent, whereas the minimum is still OK. The average SUS score falls within the upper band of OK and is very close to what is considered the average score which puts the project at 50th percentile.

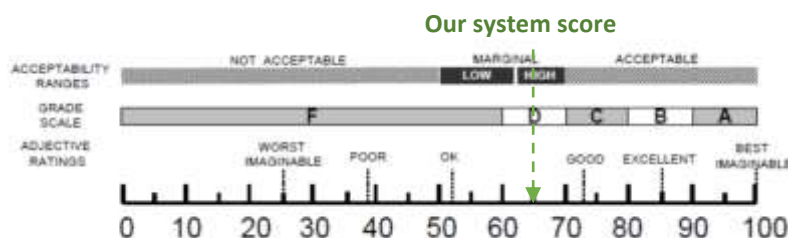


Figure 4.2: DARE platform overall score

4.2 Likes

The most relevant thing that came out from the study was that the platform is easy to use or intuitive (N¹=5). For example, one of the participants commented:

“After it finally worked, it was easy to use.” (P1)

Other things that participants liked were:

- No need for coding (N=1)
- Access from any device (N=1)
- Remote access (N=1)
- Good structure (N=1)

4.3 Challenges

The challenges which were brought into discussion were grouped into five categories, as follows:

Errors (N=4)

Four students commented that the system crashes too often, when too many cells run at the same time or when too many people were using it simultaneously:

“It didn’t work for the first time” (P1)

“Crashing when too many cells were run simultaneously” (P2)

“Multiple errors during the simulation” (P4)

Time related problems (N=4)

The time needed to wait for the system to “get it going” (P10) or to manually copying files were also problems raised by four participants:

One of the participants did not like that:

“I needed to copy file names manually twice” (P1)

Complexity (N=4)

Only one participant commented on the complexity of the system:

“It’s not so easy to handle (?) and you need more than one tutorial to get the idea” (P5)

Weird results (N=1)

One participant remarked that some of the results look weird:

“Results look weird for some steps (chess board pattern)²” (P10)

Structure (N=2)

Two participants did not like the structure/workflow”. P3 suggested to change “*maybe also the steps*”.

Lack of Feedback (N=1)

One participant remarked that the application does not have a progress indication.

¹ This notation indicates the number of participants contributing to a result.

² This may be a feature of the simulation code not the DARE platform.

When commenting what they did not like, P10 said:

“That there is no indication/progress bar with the progress of the simulation. It would be nice to see how long you have to wait”

4.4 Suggestions

The suggestions were categorised under the following sub-themes:

Usability

The usability problems (N=3) were related to:

- Time indication – a progress bar (P9)
- Status indication – *“Information that [a] cell run is finished”* (P4)
- Increased visibility – *“Some code blocks can be overseen because they are hidden (...)”* (P9)

Functionality

The suggestions (N=3) for functionality were mainly about providing example values and automatically capturing some features:

“Give example values for all parameters in the description” (P1)

“Automatically include file names in process” (P10)

“Manually putting in the run-dir” (P3)

Others

One of the students commented:

I suggest to have more than tutorial or pra... at institute, to make the students more familiar with this platform because I think it's new for all students” (P6)

Another participant suggested providing more tutorials (P5).

5 CONCLUSIONS

The response from 100% of the participants is much appreciated. This is a credit to the event organisers as well as the participants. We thank them for their effort.

The overall outcome indicates a reasonably high-level of usability. The challenges and suggestions identify opportunities for improvement that should be attempted if resources permit.

6 NEXT STEPS

The following steps are planned and will be undertaken if the event organisers agree:

1. A further questionnaire to be agreed and used for the WP7 training event 12th October.
2. A similar questionnaire to be agreed and used at the training event being organised by Federica Magnoni, late October or early November.
3. A similar questionnaire to be agreed and used at the webinar at the virtual cluster meeting being hosted by DEMOKRITOS, contact Iraklis Klampanos.
4. Follow-up interviews including research developers to get more insight into the DARE platform usability and usefulness and to collect suggestions for improvement.

The data from these questionnaires will be held at the University of Edinburgh in compliance with EU and UK regulations and conditions required for ethical approval. These will be analysed after each event and may lead to improvements for subsequent events. A report suitably anonymised for each event will be produced and made available after consultation with the event organisers.

If resources permit, follow up interviews will be conducted with a selection of volunteers from the above participants and members of the DARE project. The aims of the interviews will be to get more insights into the DARE platform usability and usefulness and to collect suggestions for improvement both in functionality and usability.

An integrated summary of the findings will be included in D2.2 for M36 (i.e., by 31st December 2020).

REFERENCES

- [1] Bangor, A., Kortum, P., & Miller, J. (2009). Determining what individual SUS scores mean: Adding an adjective rating scale. *Journal of usability studies*, 4(3): 114-123.
- [2] Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, 3(2): 77-101.
- [3] DARE. 2020. Deliverable D-3.1 M27
- [4] Dix, A., Finlay, J., Abowd, G., and Beale, R. (2004). *Human-computer interaction*. England: Pearson Education Limited.
- [5] Sauro, J. (2011). *A practical guide to the system usability scale*. Denver: Create Space.

APPENDIX A: Scoring SUS

Scoring SUS

- For odd items: subtract one from the user response.
- For even-numbered items: subtract the user responses from 5
- This scales all values from 0 to 4 (with four being the most positive response).
- Add up the converted responses for each user and multiply that total by 2.5. This converts the range of possible values from 0 to 100 instead of from 0 to 40.

APPENDIX B: Information Sheet

Participant Information Sheet

Project title:	DARE: Delivering Agile Research Excellence on European e-Infrastructures
Principal investigator:	Prof Malcolm Atkinson
Researcher collecting data:	Aurora Constantin, Michael Grund, Andreas Rietbrock
Funder (if applicable):	

This study was certified according to the Informatics Research Ethics Process, RT number 34039. Please take time to read the following information carefully. You should keep this page for your records.

Who are the researchers?

Prof Malcolm Atkinson, Aurora Constantin, Michael Grund, Andreas Rietbrock

What is the purpose of the study?

DARE is a project aiming to build a platform to help researchers in the fields of seismology, volcanology and climate to upload and download their data, share data, process data, implement their workflows, use external services to process their data, move data from one environment to another, etc.

The aims of our study are to: 1. evaluate the ease of use; 2. evaluate the user satisfaction; 3. collect usability problems; 4. assess the impact of the platform on researchers' productivity.

Why have I been asked to take part?

You explored various functionalities of the platform. We are interested to learn about your experience of using the platform in terms of ease of use, satisfaction, challenges encountered, and the potential of the platform to offer you support in achieving your tasks.

Do I have to take part?

No – participation in this study is entirely up to you. You can withdraw from the study at any time, without giving a reason. Your rights will not be affected. If you wish to withdraw, contact the PI. This may be done via a DARE representative at KIT. We will stop using your data in any publications or presentations submitted after you have withdrawn consent. However, we will keep copies of your original consent, and of your withdrawal request.

What will happen if I decide to take part?

You will receive a questionnaire, and we expect you to ask a series of question regarding your experience while using the platform. This will require a maximum of 15 minutes. This will be a one-off session.

Are there any risks associated with taking part?

There are no significant risks associated with participation.

Are there any benefits associated with taking part?

No

What will happen to the results of this study?

The results of this study may lead to improvements in the DARE platform and be summarised in published articles, reports and presentations. Quotes or key findings will be anonymised. We will remove any information that could, in our assessment, allow anyone to identify you. With your consent, information can also be used for future research. Your data may be archived for a minimum of 2 years.

Data protection and confidentiality.

Your data will be processed in accordance with Data Protection Law. All information collected about you will be kept strictly confidential. Your data will be referred to by a unique participant number rather than by name. Your data will only be viewed by the researcher/research team: Prof Malcolm Atkinson, Aurora Constantin, Michael Grund, Andreas Rietbrock.

All electronic data will be stored on a password-protected encrypted computer, on the School of Informatics' secure file servers, or on the University's secure encrypted cloud storage services (DataShare, ownCloud, or Sharepoint). Your consent information will be kept separately from your responses in order to minimise risk.

What are my data protection rights?

The University of Edinburgh is a Data Controller for the information you provide. You have the right to access information held about you. Your right of access can be exercised in accordance Data Protection Law. You also have other rights including rights of correction, erasure and objection. For more details, including the right to lodge a complaint with the Information Commissioner's Office, please visit www.ico.org.uk. Questions, comments and

requests about your personal data can also be sent to the University Data Protection Officer at dpo@ed.ac.uk.

Who can I contact?

If you have any further questions about the study, please contact the lead researcher, Prof Malcolm Atkinson, Email: Malcolm.Atkinson@ed.ac.uk

If you wish to make a complaint about the study, please contact inf-ethics@inf.ed.ac.uk. When you contact us, please provide the study title and detail the nature of your complaint.

Updated information.

If the research project changes in any way, an updated Participant Information Sheet will be made available on <https://web.inf.ed.ac.uk/infweb/research/study-updates>.

Alternative formats.

To request this document in an alternative format, such as large print or on coloured paper, please contact Aurora Constantin (Email: aurora.constantin@ed.ac.uk)

General information.

For general information about how we use your data, go to: edin.ac/privacy-research

APPENDIX C: Consent Form

Participant Consent Form

Project title:	DARE: Delivering Agile Research Excellence on European e-Infrastructures
Principal	Prof Malcolm Atkinson
Researcher:	Aurora Constantin, Michael Grund, Andreas Rietbrock, a Research Associate who will be employed later (possibly)
PI contact details:	Malcolm.Atkinson@ed.ac.uk

Please tick yes or no for each of these statements.

- | | Yes | No |
|--|--------------------------|--------------------------|
| 1. I confirm that I have read and understood the Participant Information Sheet for the above study, that I have had the opportunity to ask questions, and that any questions I had were answered to my satisfaction. | <input type="checkbox"/> | <input type="checkbox"/> |
| | Yes | No |
| 2. I understand that my participation is voluntary, and that I can withdraw at any time without giving a reason. Withdrawing will not affect any of my rights. | <input type="checkbox"/> | <input type="checkbox"/> |
| | Yes | No |
| 3. I agree to being audio recorded | <input type="checkbox"/> | <input type="checkbox"/> |
| | Yes | No |
| 4. I consent to my anonymised data being used in academic publications and presentations. | <input type="checkbox"/> | <input type="checkbox"/> |
| | Yes | No |
| 5. I understand that my anonymised data can be stored for a minimum of two years | <input type="checkbox"/> | <input type="checkbox"/> |
| | Yes | No |
| 6. I allow my data to be used in future ethically approved research. | <input type="checkbox"/> | <input type="checkbox"/> |
| | Yes | No |
| 7. I agree to take part in this study. | <input type="checkbox"/> | <input type="checkbox"/> |

Name of person giving consent

Date

Signature

dd/mm/yy

Name of person taking consent

Date
dd/mm/yy

Signature

APPENDIX D: Questionnaire

Instructions: For each of the following statements, mark one box that best describes your reactions to the website today.

	Strongly Disagree				Strongly Agree
1. I think that I would like to use this platform frequently.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. I found this platform was unnecessarily complex.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I thought this platform was easy to use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. I think that I would need assistance to be able to use this platform.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. I found the various functions in this platform were well integrated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. I thought there was too much inconsistency in this platform.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I would image that most people would learn to use this platform very quickly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. I fond this platform very cumbersome/awkward to use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. I felt very confident using this platform.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. I needed to learn a lot of things before I could get going with this platform.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. What did you like most about this platform (if you don't have enough space below, please continue on the other side)					
12. What did you like least about this platform (if you don't have enough space below, please continue on the other side)					
13. What do you suggest we improve about this platform					