

## I. IDENTIFICATION DATA

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| <b>Thesis title:</b>          | <b>Creation of a new GRASS GIS startup mechanism</b>         |
| <b>Author's name:</b>         | <b>Linda Kladivova</b>                                       |
| <b>Type of thesis :</b>       | master   |
| <b>Faculty/Institute:</b>     | Faculty of Civil Engineering (FCE)                           |
| <b>Department:</b>            | Department of Geomatics                                      |
| <b>Thesis reviewer:</b>       | Stefan Blumentrath   |
| <b>Reviewer's department:</b> | Norwegian Institute for Nature Research (NINA), Oslo, Norway |

## II. EVALUATION OF INDIVIDUAL CRITERIA

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| <b>Assignment</b>  | <b>extraordinarily challenging</b> |
| <i>How demanding was the assigned project?</i>   |                                    |
| <p>With its 37 years, GRASS GIS is a long term project with a well established user and developer base. Although the GRASS GIS community is a friendly environment, the task of re-designing an important component of the software can be seen as extraordinary challenging as it requires to convince also vocal conservative users and developers in the community, that the proposed, significant changes actually are an improvement. Also writing the a master thesis in connection to GSoC makes it harder to distinguish the two processes. It also increases the risk of failure, makes the "current state" to a moving target and thus should be seen as an extra challenge.</p> |                                    |

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| <b>Fulfilment of assignment</b>  | <b>fulfilled</b> |
| <i>How well does the thesis fulfil the assigned task? Have the primary goals been achieved? Which assigned tasks have been incompletely covered, and which parts of the thesis are overextended? Justify your answer.</i>  |                  |
| <p>The thesis both thoroughly evaluates proposed changes and lays the ground work for more long term UX oriented development in GRASS GIS. It would have been great if the detailed results from the questionnaires could have been condensed to a more clear "roadmap" for future UX development topics with areas for future development and further investigation as well as suggestions for prioritization... Still the thesis provides very valuable insight into the user experience with the GRASS GIS GUI and ways to improve it for different kinds of users.</p> |                  |

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| <b>Methodology</b>   | <b>correct</b> |
| <i>Comment on the correctness of the approach and/or the solution methods.</i>   |                |
| <p>Linda Kladivova mastered extensive dialogue with the developer community as well as users community, mainly through questionnaires and participation in development.</p> <p>However, alternative social-scientific methods to questionnaires have not been discussed, and could have been relevant. One example are interviews with focus groups (e.g. teachers working with GRASS GIS). Obviously, discussions with people offering training in GRASS GIS did happen in the course of the thesis, though seemingly not in a formalized way of interviews. That means there is probably a lack of explicitness, but the technique has been applied (though not thoroughly). The same is true for other development techniques, which are applied but not mentioned, like "prototyping" or other aspects of an agile development paradigm.</p> <p>Another relevant methodological alternative would have been interviews with students that encounter GRASS GIS for the first time e.g. in a class. Such respondents actually would provide the most relevant group of respondents, cause they have the fresh experience and in this group one will also include persons that chose to drop GRASS for UX reasons. Also "mini" lab exercises in such a context could have delivered very relevant and reliable information ("now you just learned GRASS 7.8, for the next version this alternative startup is considered, what do you think?").</p> <p>In general, it is important that the purpose of the questionnaire steers both what questions to ask and how they are asked. If in questionnaire 2, question 1 the purpose was to evaluate the info-bar-solution against other implementations (e.g. situation before 7.8), respondents could have been split into independent groups with different mockups and differences compared (of course this requires a sufficient number of participants). Still the effect of info bars is subject to an explicit question which also covers this issue.</p> |                |

Also, with questionnaires you can confirm or falsify hypothesis but they are less suitable for exploratory analysis (finding topics the researcher did not think of in advance). Interviews allow to ask follow up question, help identify the "main stories" or reoccurring topics and new undiscovered issues.

A methodological shortcoming of the thesis is the limited amount of grounding of the - otherwise excellent work - in theory. UX design theory is discussed only very briefly, if at all.

For analysis of the questionnaire 1 differences in respondent groups could have analysed. E.g. experienced vs. first time users, experienced users may lack imagination how their first experience in fact was or would be, so for FTUE-related question real first time users probably should get more weight if they answer significantly different.

## Technical level

**A - excellent.**

*Is the thesis technically sound? How well did the student employ expertise in the field of his/her field of study? Does the student explain clearly what he/she has done?*

Through both interaction with the GRASS GIS community as well as frequent contributions to the active development, offering alternative implementations, Linda Kládiová showed the ability to both pick up important user needs / preferences and propose and design implementations that are perceived by a vast majority as UX improvements. That way she was able to convince even conservative users – that tend to stick to established and familiar work flows - of the usability improvements of the significant proposed (and implemented) changes for the how the software starts.

## Formal and language level, scope of thesis

**B - very good.**

*Are formalisms and notations used properly? Is the thesis organized in a logical way? Is the thesis sufficiently extensive? Is the thesis well-presented? Is the language clear and understandable? Is the English satisfactory?*

Formally, the thesis is written very tidy and well worked through. Minor/neglectable formal issues are related to numbering: If you have a chapter 1.1.1 you should also have at least 1.1.2... Also Discussion should have a number.

The author makes good use of clean, high quality illustrations.

With regards to the structure of the thesis, there is generally a bit too much focus on details (e.g. regarding technical implementations and obstacles), that obscure the broader picture and golden thread in the thesis. The introduction is a bit long and contain parts of amongst others a methods section. In the introduction, information is presented that can be understand as part of the actual work (description of the current status). The objectives (1.5) should have been a main (1.order) chapter. Objectives are described very (too) brief and could have been more clear / concrete. A methods chapter is unfortunately missing. Together with a more clear description of the objectives it could have helped explaining the content and structure of the thesis. Esp. the relation between objectives and methods should have been described and become more clear, preferable in a "methods and data" chapter.

As with the structure of the thesis, the overall story drowned a bit in the description of details already at the beginning. More focus on important, general findings, and less details would have improved the – still very good – thesis. The focus on details manifests itself a bit too lengthy description of types of questions, as well as EDA and data types and a bit too many plots of e.g. question 3 in survey 1 (figure 44-47). Figure 46 would have been enough.

Also, words like "unfortunate", "better" (e.g. in "creating a better GRASS GIS startup mechanism", "the sort of unfortunate GRASS startup mechanism") should be avoided to describe technical solutions cause they are imprecise.

Sometimes conclusions are not clearly grounded in results of the user survey. E.g.: the claim that renaming database, locations, mapset to something like database/project/subproject will reduce criticism is only weakly supported by study results. The same applies for harmonizing QGIS and GRASS module interfaces which according to the author should be done in GRASS GIS. It was mentioned by one respondent and has not been investigated more deeply.

## Selection of sources, citation correctness

**B - very good.**

*Does the thesis make adequate reference to earlier work on the topic? Was the selection of sources adequate? Is the student's original work clearly distinguished from earlier work in the field? Do the bibliographic citations meet the standards?*

The focus of both the master thesis and the literature used have been on first time user experience (FTUE) and usability testing, so the choice of literature is adequate. Other sources used are cited correctly, consequent, appropriate and in a clear and tidy manner.

However, a section on some sort of theory based "usability ideal" for the GRASS GIS startup is missing (though the implementation obviously operates with an ideal of "fast-tracking" the user to analyse data. Also - as discussed in the "Methodology" section, the thesis could have been better grounded in UX design theory and development paradigms.

### **Additional commentary and evaluation (optional)**

*Comment on the overall quality of the thesis, its novelty and its impact on the field, its strengths and weaknesses, the utility of the solution that is presented, the theoretical/formal level, the student's skillfulness, etc.*

Linda Kladviva excelled with the achieved results, in interaction with the community and user oriented development. The thesis lays important ground work for long term UX development provides ideas for important aims with regards to user experience of the GUI. If the written part of the thesis had more focus on the important aspects (oriented on the objectives and clearly structured in this regards), a better grounding of the work in relevant development theory and e.g. more clear suggestion of a more general development road map I would have been inclined to grad the work as A.

### **III. OVERALL EVALUATION, QUESTIONS FOR THE PRESENTATION AND DEFENSE OF THE THESIS, SUGGESTED GRADE**

*Summarize your opinion on the thesis and explain your final grading. Pose questions that should be answered during the presentation and defense of the student's work.*

Questions I would pose to Linda Kladviva are as follows:

- 1) You used a definition of usability as "to whether or not users can achieve specific goals with efficiency, effectiveness, and satisfaction". How would that definition translate to the GRASS GIS startup? What would characterize a most user-friendly startup mechanism?
- 2) What would be the five main topics on a long term roadmap for further UX development in GRASS GIS and why (consider effect and probably effort)?
- 3) How does the concept of the PERMANENT mapset affect user experience? Is it an asset, irrelevant or an obstacle to new users?
- 4) How does the search path concept integrate with the data catalogue? Do you expect confusion among users when visible maps in the catalog are not available in modules interfaces?

The grade that I award for the thesis is **B - very good**.

Date: **1.2.2021**

Signature:

