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Improved quality with better user interface in transport models?

Trafikdage på Aalborg Universitet, 2014

Background

- SINTEF have been involved in developing the Regional Transport Model (RTM) in Norway.
- Next to development we also offer user support the transport models. Users are both government and consultants.
- We have experience with a range of user errors, for simple input file errors to critical misunderstandings on important methodology.
- During 10 years of development, we think the RTM model have a decent user interface, but still room for improvement.
- Compared to earlier model work by SINTEF, and other transport models in Norway, we feel that the improved user interface in the RTM model improves quality.

Hypothesis

- Initial hypothesis:
 - **Will transport models with a better user interface improve result quality?**
- After studying literature about usability I found that the usability of the current RTM model was not ideal, so the question was more angled at:
 - **How to improve the current model system for better usability**

User interfaces in Norwegian transport models

- Scenario management was absent in models pre 2000
- Networks, routes and tables had to be linked to the model's file system at the right place and in the right format
- Input data format was dictated by the model's needs and not on what was practical for the user.
- The Norwegian Regional transport model was introduced in 2004
- One separate model with different premises for each model area. The RTM model is area independent so the user needs to learn one system.
- The RTM user interface has evolved to a mature system

The RTM user interface

- Complex work to prepare a scenario:
 - Networks and routes are edited using ArcMap extension (purpose built)
 - Zonal data and other tables strictly databases.
 - External trip matrices and fixed freight matrix
- File format focuses on content, and not defined by the model system. Large part of the RTM model is to convert user input files to various text formats required by the demand model.
- User interface where all files are linked into a scenario manager.
- Scenario report generated after successful run. Contains file names of all input data, logical warnings and key results.
- Two reports describes the RTM user interface
 - Tørset et al (2013) Model description, best practices, special premises.
 - Malmin (2013): Technical documentation, user interface guide and example.

Transport model errors

- Direct error
 - The model run aborts with a more or less informative message.
 - Caused by error in input data or scenario setup or both
- Systematic error
 - Error in input data, but the model run is successful
 - Results are skewed, strange or plain wrong
 - Difficult to troubleshoot without experience

Common user support requests

User support requests are divided in three categories, and have several causes

- Something is not working or results are strange
 - Input data error
 - Scenario setup
 - Wrong use of methods, confusion about the models premises, systematic errors
- How is the model working?
 - Requests about methodology ahead of a task (premises, input file formats)
- Bug report
 - Not pleasant, but all aspects of model use can not be tested before release

User support analysis

- Analysed user support emails from 2013 and 2014
- From late April 2014 telephone and instant messages are logged (Introduced issue tracking)

Category	N	Share (%)
Input error	6	10
Scenario error	10	16
Confusion	12	19
Methodology	27	44
Bug report	7	11
All requests	62	100

User support analysis (2)

- 26 % of the user support requests were related to direct errors in input data and setup
- 66 % of user requests were related to methodology. About 2/3 were questions in advance.
- A majority of errors and questions could be avoided by reading the documentation
- Most common systematic errors can be identified in the RTM Scenario report
- Why do not users read the documentation? Possibly due to heavy time constraints
- How about the users who misunderstood the model, but didn't ask questions?

Usability

- A large special field in computer science.
- Short summary on user interfaces (UI):
 - UI must be designed on the users premises, not on the systems premises
 - The system workflow must replicate the users workflow
 - Documentation are rarely read due to time constraints
 - The user interface must guide the user to correct input data with the least amount of information.

Usability of transport models

- Not very good
- Input data are usually on the systems premises
- Many different pieces of software needed to set up a scenario
- The documentation are mostly focused on demand model estimation and model calibration
- From experience: After the initial run of all scenarios in an analysis, we see all the systematic errors and all the scenarios need to be run again. Very time consuming.

Conclusions

- Users are uncertain about methods and best practices using the model
- Users use user support to increase knowledge and not as much as help when they are stuck.
- The user interface needs improvement to better guide the users to avoid systematic errors.
- Time should be spent on improving input data quality and not fighting the system

Thank you for your attention!

Recommended reading:

- Jonas Söderström: Jævla Drittsystem!
- Original in Swedish (2011)
- Released in Norwegian in 2013
- Danish?
- A book on usability by examples from using too many different and difficult computer systems in workplaces in the Nordic countries

