User Study: Lessons Learned

Jaroslav Šnajberk
Department of Computer Sciences and Engineering
Faculty of Applied Sciences
University of West Bohemia in Pilsen

Agenda

- Introduction
- Preparations
- The user study
- Processing of results
- Writing article
- References

Introduction

- Evaluation of AIVA
  - AIVA visualizes structure of component-based software
  - It is new and interactive information visualization tool
  - Case-study on complexity
  - User-study on user performance
- This is what we learned

Preparations

- Decide what you will test
  - We wanted to measure performance – how fast can one finish set of tasks
- Design a test scenario
  - We selected six core tasks in component visualization
- Try test scenario
  - Try it yourself, redesign
  - Let someone else try it, redesign

Preparations

- Design the user study
  - How many people – 12
  - Type of user study – comparative = compare with RSA
  - Form of user study – guided 1on1 + interview
- And finally…
  - Threads to validity
  - Eliminate advantage
  - Try it, first attempt will probably fail

The user study

- This is the easiest part, just do what you prepared
  - If you tried it before it should be fine
  - Just collect all the data for future

AIVA						UML					
Q1	Q2	Q3	Q4	Q5	Q6	Q1	Q2	Q3	Q4	Q5	Q6
0:46	0:11	0:20	0:32	0:33	0:28	1:04	2:40	0:12	2:56	2:43	2:10
0:16	0:09	0:42	0:25	0:35	0:25	1:22	2:06	0:11	1:40	2:39	2:08
0:22	0:08	0:18	1:02	0:23	0:27	1:13	2:30	0:25	1:58	2:49	2:14
0:23	0:22	0:19	0:40	0:23	0:29	0:43	0:30	0:07	0:39	1:46	1:20
0:51	0:33	0:20	0:41	0:44	0:50	1:19	1:30	0:27	1:23	2:25	2:10
0:12	0:10	0:11	1:20	0:22	0:10	0:36	0:59	0:17	0:43	1:41	1:00
0:25	0:09	0:23	0:27	0:31	0:38	1:24	1:05	0:21	1:01	1:40	2:49
0:29	0:06	0:16	0:37	0:29	0:16	0:46	1:14	0:09	0:54	2:17	0:52
0:07	0:04	0:08	0:24	0:16	0:24	0:52	0:34	0:08	0:28	1:00	0:36
0:15	0:24	0:17	0:31	0:25	0:17	0:59	1:06	0:21	0:40	1:48	1:28

Processing the results

- Perform analysis on the data
  - Average, median, standard deviation, etc.
  - More advanced if needed
- What does the results show
  - Be precise, prevent misunderstandings
  - Any success is suspicious for others

Writing article

- Hypothesis and null hypothesis you tested
  - If you did not made one at the start of user study
- Describe how the study was designed
  - Goal of the study
  - Profile of participants
  - How did you performed the study
  - List of tasks
  - Other elements, that could biased the results
- Anyone should be able to recreate it now

Writing article

- Presenting results
  - Show all the raw data, so analysis can be verified
  - Add all your analysis
  - Do not compare results yet
- Compare results
  - Show graphic comparison
  - Add some mathematics
  - Just present these numbers, without discussion and conclusions

Writing article

- Discussion
  - This is the hardest part
  - Discuss all pros and cons, trade-offs, etc.
  - Discuss if different tasks could make different outcome
  - If you questioned participants summarize their opinions
  - Create conclusions of the whole study
  - You must convince all that scientists this is valid result

References

[1] C. Forsell, "A guide to scientific evaluation in information visualization," in *Information Visualisation (IV), 2010 14th International Conference*, july 2010, pp. 162 –169.

[2] C. North, "Toward measuring visualization insight," *Computer Graphics and Applications, IEEE*, vol. 26, no. 3, pp. 6 –9, may-june 2006.

[3] M. Sensalire, P. Ogao, and A. Telea, "Evaluation of software visualization tools: Lessons learned," in *Visualizing Software for Understanding and Analysis, 2009. VISSOFT 2009. 5th IEEE International Workshop on*, 2009, pp. 19 –26.

References

[4] S. Carpendale, "Evaluating information visualizations," in *Information Visualization*, ser. Lecture Notes in Computer Science, A. Kerren, J. Stasko, J.-D. Fekete, and C. North, Eds. Springer Berlin / Heidelberg, 2008, vol. 4950, pp. 19–45.

[5] D. H. Laidlaw, J. S. Davidson, T. S. Miller, M. da Silva, R. M. Kirby, W. H. Warren, and M. Tarr, "Quantitative comparative evaluation of 2d vector field visualization methods," in *Proceedings of the conference on Visualization '01*, ser. VIS '01. Washington, DC, USA: IEEE Computer Society, 2001, pp. 143–150.

[6] R. Kosara, C. G. Healey, V. Interrante, D. H. Laidlaw, and C. Ware, "Thoughts on user studies: Why, how, and when," *IEEE Computer Graphics and Applications*, vol. 23, p. 2003, 2003.

Thank you