Usability Assessment of the Missouri Cancer Registry's Published Interactive Mapping Reports: Round Two

Awatef Ahmed Ben Ramadan, MD, MPH, PhD candidate[1,2,3]; Jeannette Jackson-Thompson, MSPH, PhD[1,2,3]; Chester Schmaltz, PhD[1,2]

University of Missouri-Columbia (MU): [1]Missouri Cancer Registry and Research Center (MCR-ARC), [2]School of Medicine Department of Health Management and Informatics (HMI), [3]MU Informatics Institute (MUII)

BACKGROUND

- Health-related data's users often have trouble understanding and interpreting combined statistical and spatial information.
- This is the second round of a usability study conducted after we modified and simplified our tested maps based on the first round's results; the initial study was conducted with seven participants who were academic health professionals.
- We assumed that the first round's results might be tightly connected to the insights of the academic health professionals; for that reason, we conducted this round with health professionals who handle cancer registration, analyze incidence/mortality data, advocate for cancer-related policy changes, etc.

STUDY AIMS

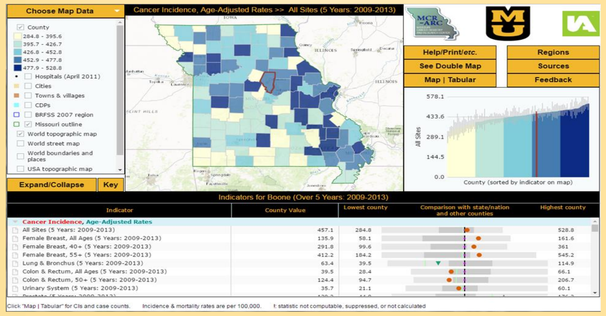
- To explore if the tested maps' usability improved by modifying the maps according to the first round's results.
- To evaluate if and to what extent users' actions may be influenced by a user's demographic information, experience, education level and work type.

METHODS

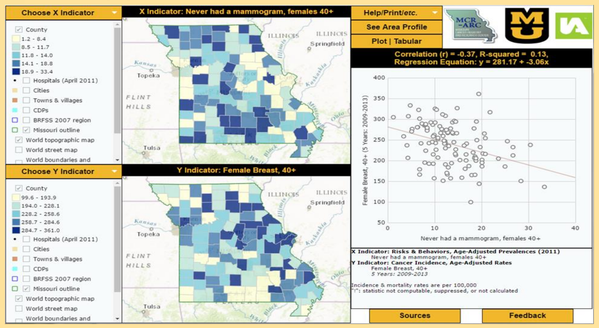
- We recruited 13 cancer professionals attending the North American Association of Central Cancer Registries (NAACCR) 2016 Annual Conference.
- The study involved 3 phases per participant: A pretest questionnaire, the multi-task usability test and the System Usability Scale (SUS).
- Software was used to record the computer screen during the trial.
- We measured several qualitative and quantitative usability metrics. The study's data was analyzed using spreadsheet software.

TESTED MAPS

- **Area Health Profile Map** (https://goo.gl/pZuHeo)



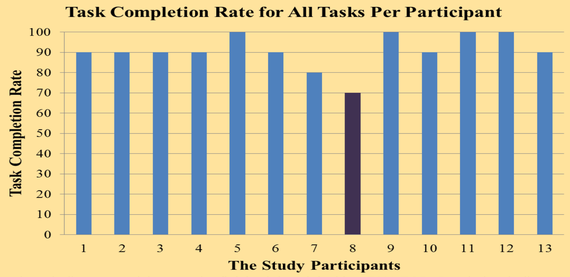
- **Double Map** (https://goo.gl/huy9FJ)



RESULTS

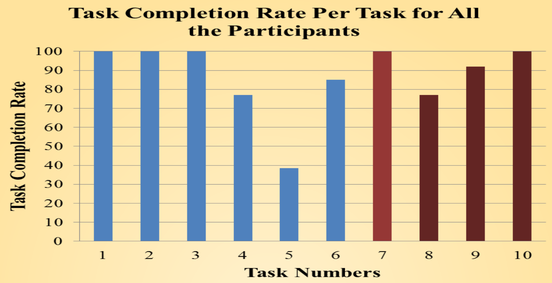
Effectiveness

- **Effectiveness by Participant**



Blue bars indicates participants who finished the trial with > 78% TCR; Purple bar indicates a participant who finished the trial with <78% TCR.

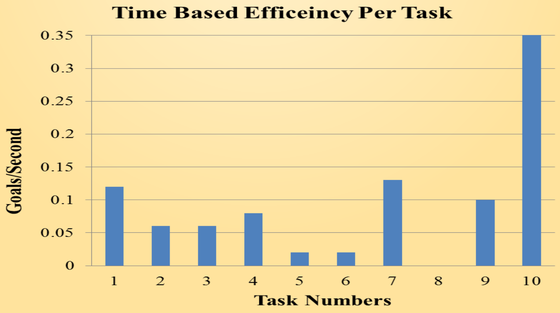
- **Effectiveness by Task**



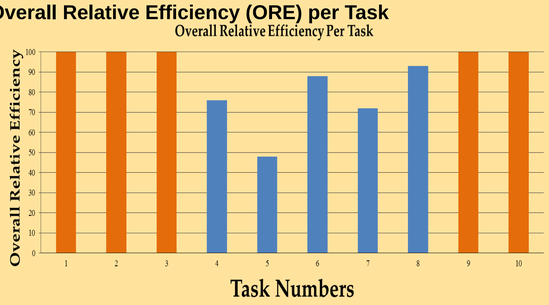
Blue indicates tasks involving the Area Health Profile (Tasks 1–6); red indicates tasks involving the Double Map (Tasks 7–10)

Efficiency

- **Time-based Efficiency by Task**

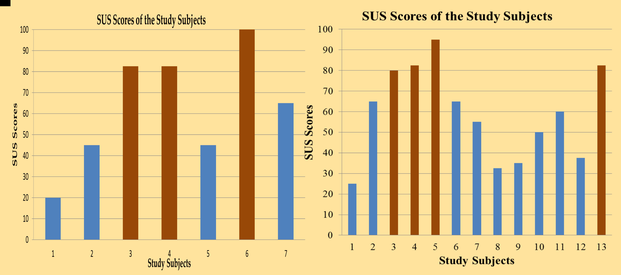


- **Overall Relative Efficiency (ORE) per Task**



Orange indicates tasks with 100% ORE per task, blue indicates task with less than 100% ORE per task

User Satisfaction



Round (1) **Round (2)**

Brown color indicates SUS score of > 68 points, and blue color indicates SUS score of < 68 points

Factors that affected participants' performance

The Compared Factors	P
Education Level vs TCR	.72
Education Level vs SUS Score	.21
Work Type vs TCR	.63
Previous Experience in Healthcare Field vs TCR	.51
Previous Experience in GIS Use vs TCR	.17
Previous Experience in GIS Use vs SUS Score	.61

Correlation between Studied Usability Elements (Effectiveness, Efficiency and Satisfaction)

The Compared Factors	Correlation Coefficient	P
TCR vs SUS Score	.31	.31
TCR vs TBE	.39	.18
TCR vs ORE	.81	<.001
Efficiency Per Participant* vs SUS Score	.92	<.001

*: The total time in seconds of the whole trial per participant

ROUND 1 PUBLICATION & CONTACT INFORMATION

The results of the first round have been published:

Ben Ramadan AA, Jackson-Thompson J, Schmaltz CL. *Usability Assessment of the Missouri Cancer Registry's Published Interactive Mapping Reports: Round One.* JMIR Hum Factors 2017;4(3):e19.
URL: https://goo.gl/VZf669.

For more information about the two rounds of the study, contact us at:

aab365@mail.Missouri.edu
SchmaltzC@Missouri.edu
JacksonThompsonJ@health.Missouri.edu

DISCUSSION

- The trial was conducted effectively despite the diversity in the education, public health and GIS experience of the subjects.
- A PhD holder with cancer and public-health field experience could not achieve the minimally acceptable TCR, while the other lower educated and less experienced subjects could handle the test effectively.
- The easy-ranked tasks were accomplished more effectively than the tasks ranked as complicated. These findings support the previous study's findings.
- Task #6—a complex task—was conducted successfully in both study rounds, possibly because:
  - It is linked to prior tasks and easier to handle after the subject has solved the preceding tasks.
- As we revealed from the first round, this round of the study found that some subjects took longer to accomplish the tasks effectively than others for even the simply-ranked tasks.
- Repeating and retrying preceding tasks facilitated the completion of some complicated tasks.
- Both rounds have averages and medians of less than 68 points on the SUS scale.
- Second-round subjects, while less educated, had comparable satisfaction results to first-round subjects, who held graduate degrees and had experience in statistical and epidemiological knowledge as well as previous experience in using GIS tools.
- We assumed that when we updated our maps according to the first round's results, we simplified our tested maps to fit the needs of our potential users of different experience levels.
- By updating the maps, we made the maps more user-friendly and the participants conducted the trial more efficiently.

CONCLUSIONS

- The current study, unlike the previous round, did not detect a statistically significant relationship between the subjects' performance on the study's test and having previous experience in using GIS tools.
- Updating the tested maps and tasks made the reports simpler to use, even by users without previous GIS experience.
- The mapping reports should be refined and modified to correct revealed usability concerns and to meet perceptions and requirements of the maps' potential users.
- The two-round study methodology could be applied on other MCR-ARC atlases and might serve to improve the usability of these maps.
- Including GIS tools' users should be considered at the initial phases of planning and creating GIS reports.

ACKNOWLEDGMENT

MCR data collection activities are supported in part by a cooperative agreement between the Centers for Disease Control and Prevention (CDC) and the Missouri Department of Health and Senior Services (DHSS) (NU58DP006299-01) and a Surveillance Contract between DHSS and the University of Missouri. We want to thank reporting facility staff for their ongoing efforts to report new cancer cases to MCR.

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