

## Introduction

- A major barrier to EHR adoption is that clinicians find these systems inefficient and difficult to use[1]
- There is a lack of objective and reliable measures of user performance for common clinical tasks in EHRs
- Keystroke Level Models (KLM) can be used to analyze work flows and identify factors for work flow optimization, and have been demonstrated to accurately predict skilled user performance time [2, 3]

## Research Goals

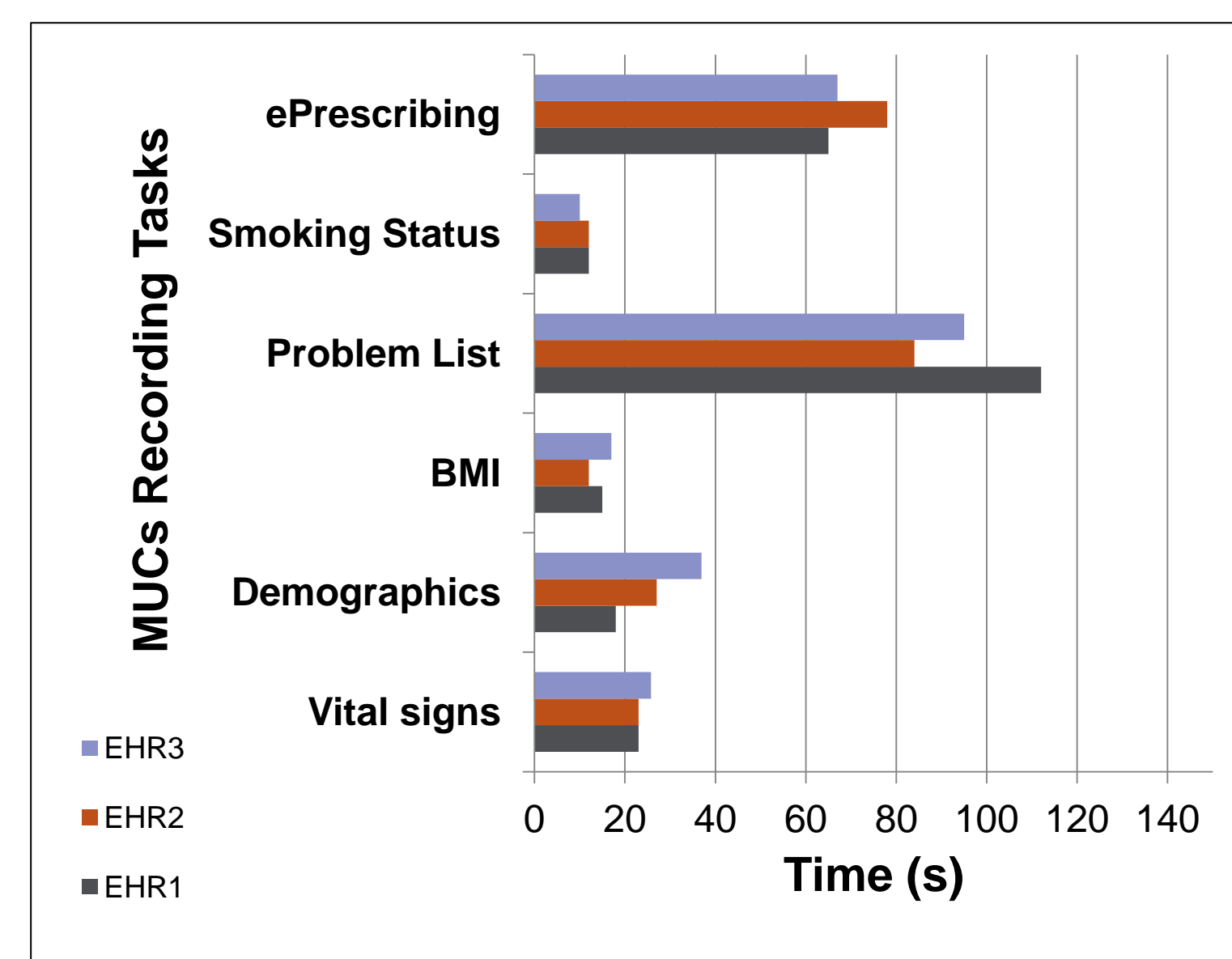
- Measure skilled user performance time for tasks within NIST meaningful use cases (MUCs) [4]
- Establish benchmarks for MUC time
- Compare and analyze work flows for MUCs across EHRs

## Method

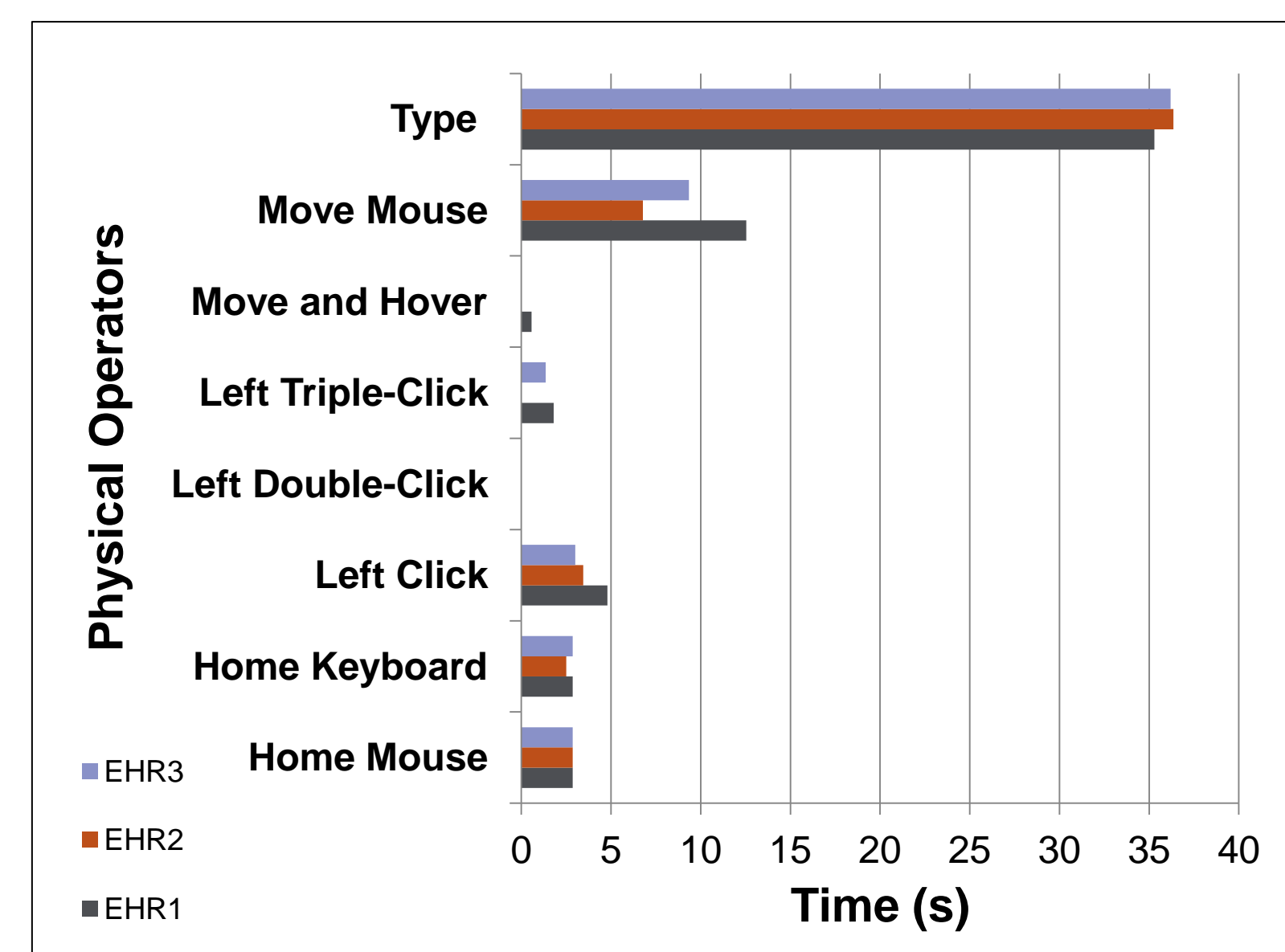
- CogTool [5], a KLM tool, was used to analyze 6 MUCs (e.g., ePrescribing, smoking status) across 3 EHRs
- Task execution times were predicted by CogTool, and resulting times were compared across EHRs
- Time for each physical operator (see Figure 2) was analyzed for variability
- Recommendations for improving task efficiency were generated

For additional information, please contact [SHARPC@uth.tmc.edu](mailto:SHARPC@uth.tmc.edu)

## Results

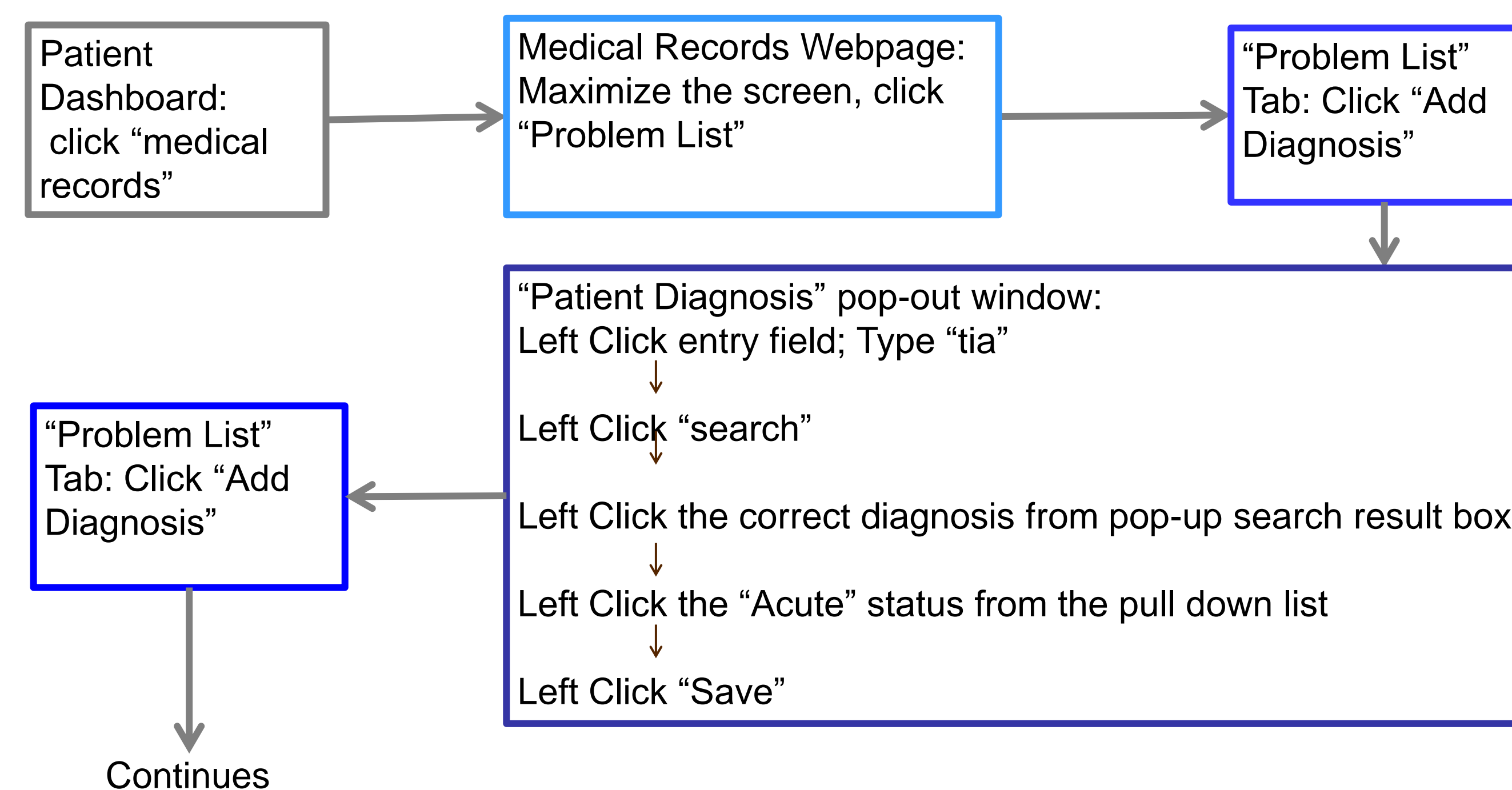


**Figure 1.** Predicted task execution time for 6 MU objectives across 3 EHRs



**Figure 2.** Time for physical operators in Recording Problem List across 3 EHRs

## Portion of work flow for recording problem list for EHR1



## Summary of Conclusions

- Although KLM results were different across MUCs, there was surprising consistency in task time across the 3 EHR products
  - Problem List had the longest execution time and greatest variability across EHRs

## Next Steps

- Compare and analyze clinical task work flows in different EHRs
- Optimize the work flow according KLM to reduce task execution time
- Collecting data across larger samples will allow creation of benchmarks for NIST MUCs

## References

1. Smelcer JB, Miller-Jacobs H, Kantrovich L. Usability of Electronic Medical Records. Journal of Usability Studies.2009;4:70-84.
2. John BE, Suzuki S. Toward cognitive modeling for predicting usability. To appear in HCI international 2009.
3. John BE. Using predictive human performance models to inspire and support UI design recommendations. Proceeding of ACM CHI'11 session on predicting & modeling human behaviors 2011.
4. <http://www.nist.gov/index.html> (accessed Oct 14th, 2011).
5. <http://cogtool.hcii.cs.cmu.edu/> (accessed Feb 15th, 2011).

## Acknowledgement

This project was supported by Grant No. 10510592 for Patient-Centered Cognitive Support under the Strategic Health IT Advanced Research Projects (SHARP) from the Office of the National Coordinator for Health Information Technology.