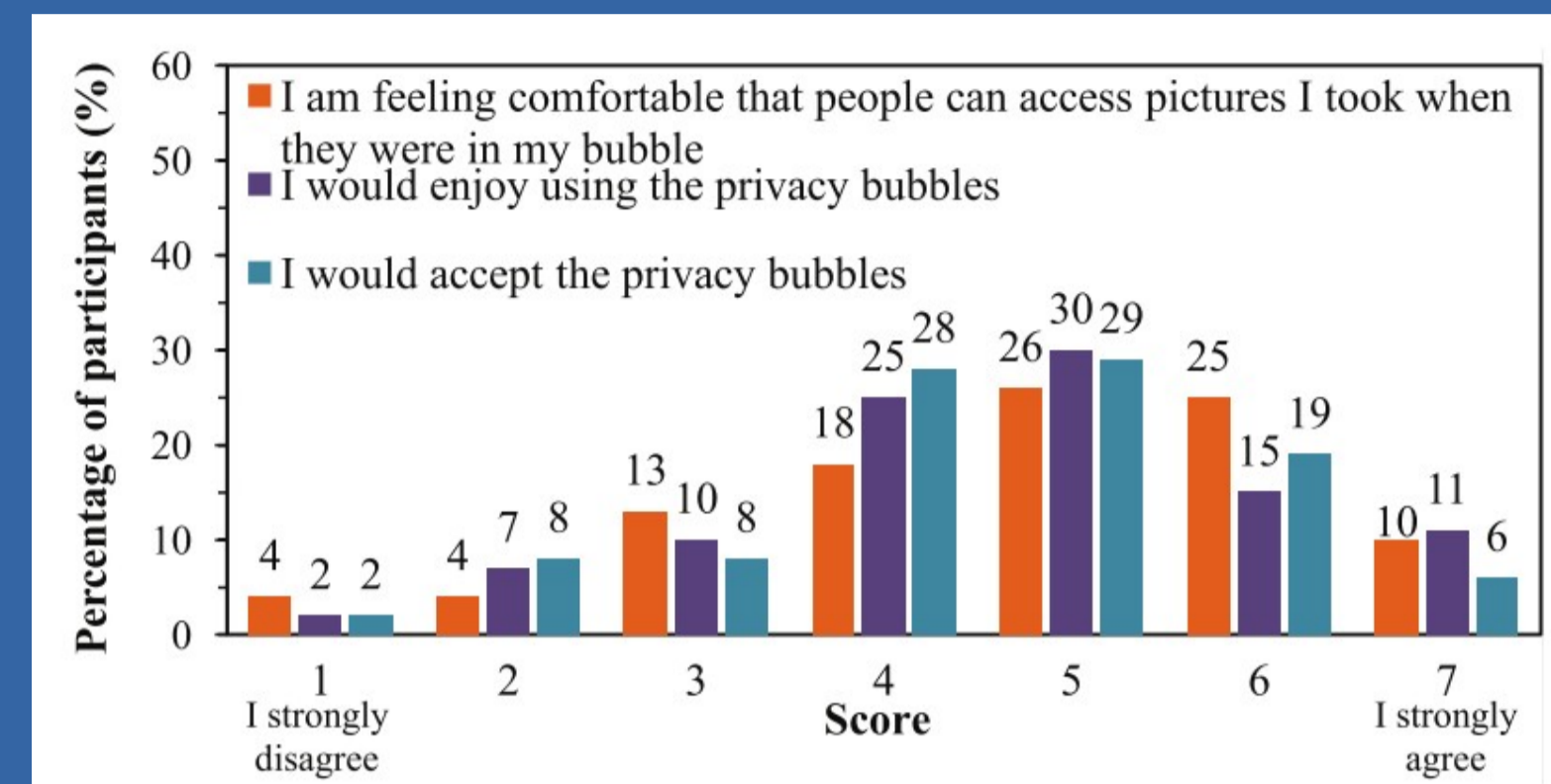
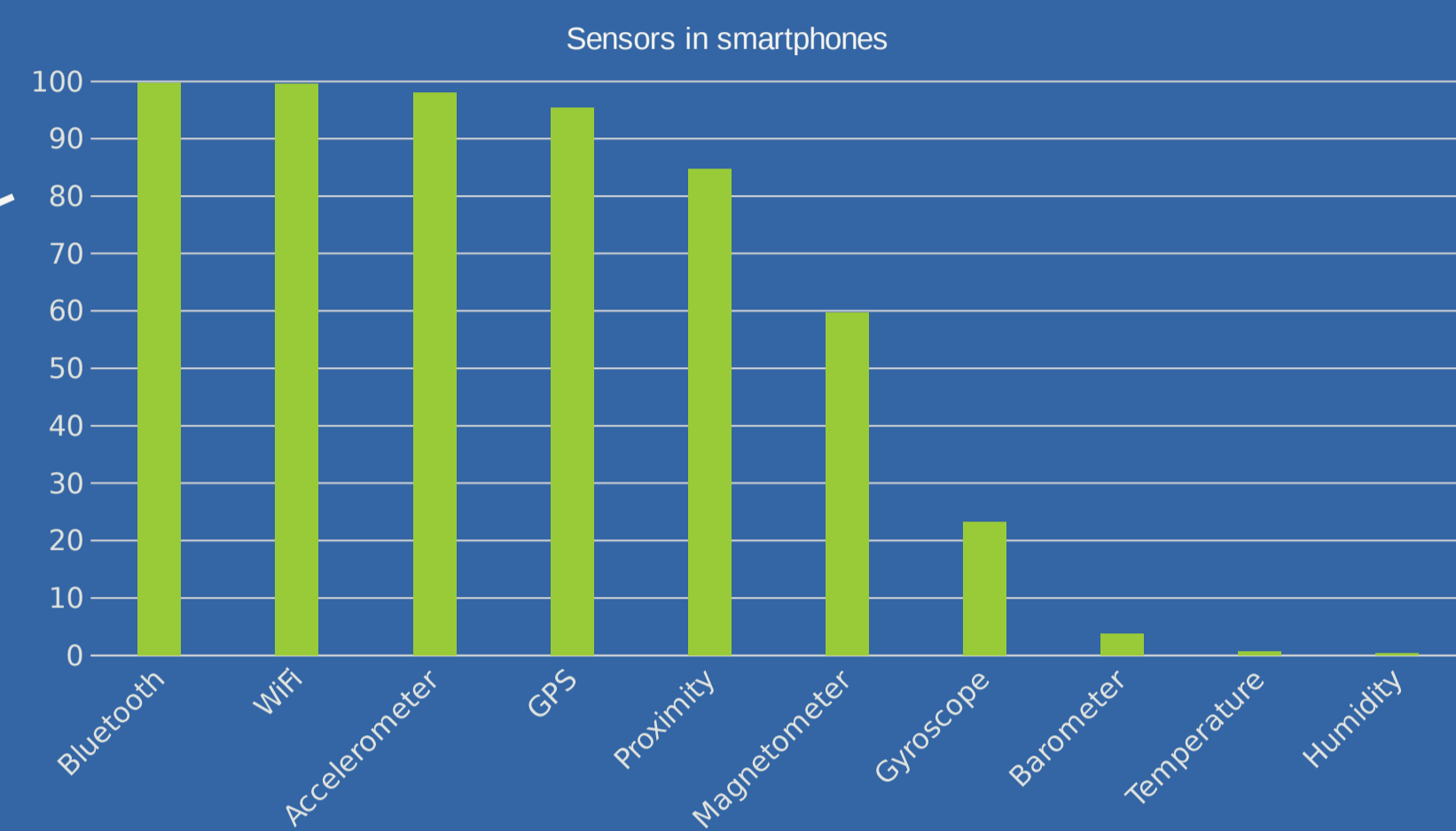
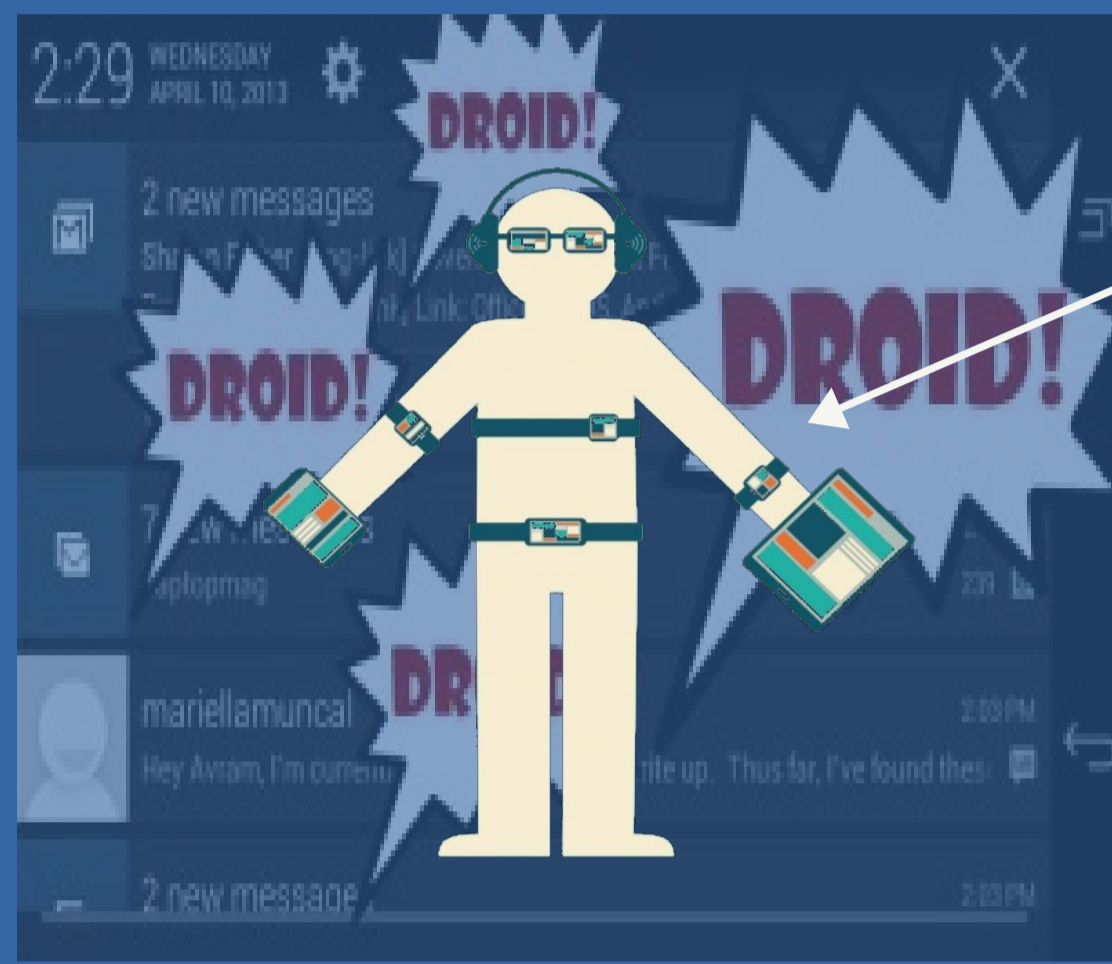


# DISTRIBUTED COLLABORATION IN CONTEXT-AWARE SYSTEMS: AVOIDING DISRUPTION TO BOTH USERS AND THEIR NEIGHBORHOOD

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## Motivation

The proliferation of mobile sensor-enabled devices and the disruption they cause [1] increase the demand for context-aware systems. Current research on context-dependent behavior focuses on routine inference through training [2]. This thesis aims to study the possibilities of collaborative strategies for this task. These strategies will allow not to limit adaptation to everyday activities, but to expand it to unusual situations. Even though collaboration is not a novel idea [3] and despite proven users' willingness to cooperate [4], research in this area has been scarce.



Users' willingness to share data with others in their nearby area (bubble) [4]

## Objectives

Design, development and evaluation of a context-aware and collaborative framework. This framework will combine information from nearby devices to support autonomous decision-making and improve adaptation to unusual situations. Research areas: distributed and proximity-based communications, data fusion, context inference, decision strategies, privacy

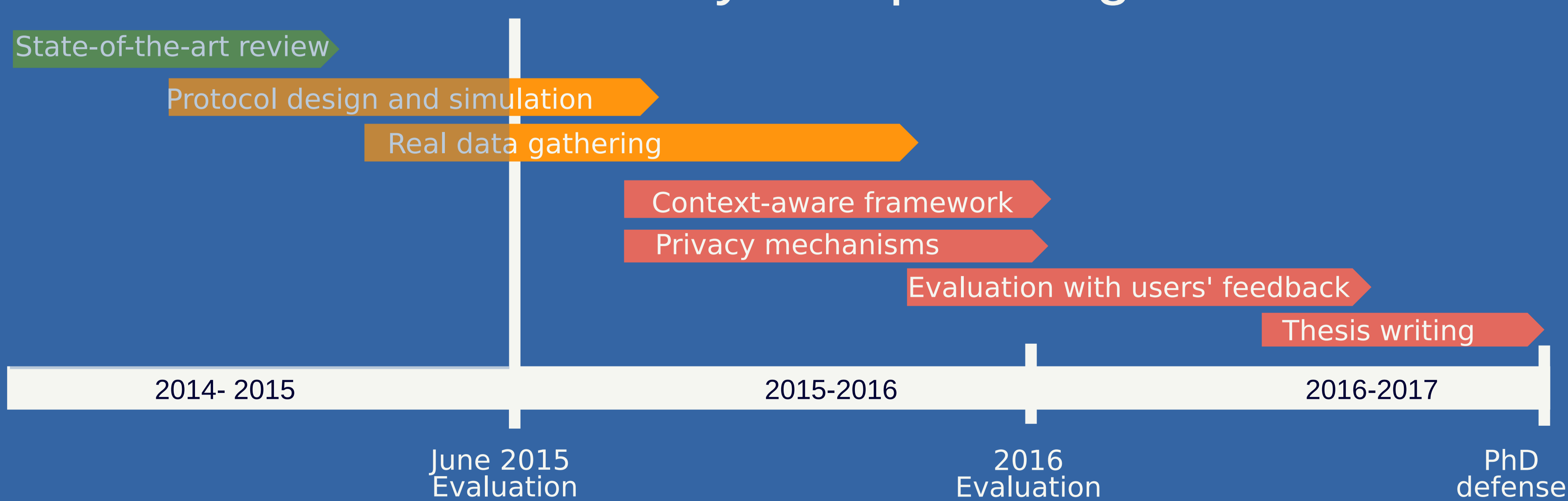
## Research plan

- Comprehensive literature review in context detection, context-aware adaptation and device collaboration.
- Design of a specific protocol to enable collaboration between nearby context-aware systems.
- Application of data fusion techniques to context data from different sources.
- Development of a context-aware framework that employs data analysis and heuristics to decide suitable device behavior in different circumstances.
- Proposal of mechanisms to ensure responsible and privacy-aware data management.
- Gathering of real data on users' context changes.
- Evaluation of the proposals employing simulations based on real data and users' feedback.
- Result dissemination through publications in international conferences, workshops and journals.

## Preliminary results

- Measurements have been performed in order to obtain data from people movements in several areas of the faculty
- A protocol for context-related information exchange has been designed. Simulation results based on gathered data will be available by the end of June and submitted to a conference (potentially *MobiCASE 2015*). In September, we plan to submit a journal article (potentially to *Expert Systems and Applications*)

## Next years planning



## Proposed framework scheme



## References

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- [2] T. Maekawa, N. Yamashita, and Y. Sakurai, "How Well Can a User's Location Privacy Preferences be Determined Without Using GPS Location Data?," *IEEE Transactions on Emerging Topics in Computing*, vol. 6750, no. c, pp. 1-13, 2014.
- [3] P. Huuskonen, J. Mäntyjärvi, and V. Kónönen, "Collaborative Context Recognition for Mobile Devices," *Handbook of Ambient Intelligence and Smart Environments. Springer US*, pp. 257-280, 2010.
- [4] D. Christin, P. Sánchez López, A. Reinhardt, M. Hollick, and M. Kauer, "Share with strangers: Privacy bubbles as user-centered privacy control for mobile content sharing applications," *Information Security Technical Report*, vol. 17, no. 3, pp. 105-116, 2013.