ROOMCAST
Preliminary document

The present document consists of two sections: the first lists the papers I've carefully read so far among those I found and skimmed to get an idea of the amount of work related to our area of research. The first 4 papers are the "foundational" ones, those which introduced the notions of Ubiquitous Computing, Calm Technology and Ambient Display. The second section includes a brief discussion about my initial view and considerations about the system, with many open questions to be further discussed.

RELATED WORK

1. Weiser, M. The computer for the 21st century. In *Scientific american* 265, no. 3 (1991), pp. 94-104.

2. Weiser, M. and Brown, J. S. The coming age of calm technology. In *Beyond calculation,* Springer New York, (1997), pp. 75-85.

3. Ishii, H. and Ullmer, B. Tangible bits: towards seamless interfaces between people, bits and atoms. In *Proceedings of the ACM SIGCHI Conference on Human factors in computing systems,* ACM, (1997), pp. 234-241.

4. Wisneski, C., Ishii, H., Dahley, A., Gorbet, M., Brave, S., Ullmer, B., and Yarin, P. Ambient displays: Turning architectural space into an interface between people and digital information. In *Cooperative buildings: Integrating information, organization, and architecture,* Springer Berlin Heidelberg, (1998), pp. 22-32.

5. Matthews, T., Dey, A. K., Mankoff, J., Carter, S., and Rattenbury, T. A toolkit for managing user attention in peripheral displays. In *Proceedings of the 17th annual ACM symposium on User interface software and technology*, ACM, (2004), pp. 247-256.

6. Bakker, S., van den Hoven, E., Eggen, B., and Overbeeke, K. Exploring peripheral interaction design for primary school teachers. In *Proceedings of the Sixth International Conference on Tangible, Embedded and Embodied Interaction*, ACM, (2012), pp. 245-252.

7. Bakker, S., van den Hoven, E., and Eggen, B. FireFlies: supporting primary school teachers through open-ended interaction design. In *Proceedings of the 24th Australian Computer-Human Interaction Conference*, ACM, (2013), pp. 26-29.

DISCUSSION

I only had a quick conversation with Gugo about what he though the main features of the system could be. However, he told me that it was only a starting and rough idea: we will have to setup a meeting to discuss more in detail about the specifications of the system.
For now, the following are some general features that could be implemented:

- the system consists of an interactive ambient display for the classroom: it is composed of a front-end (probably web-based) to display some (one or more at the same time?) desired channels and a

back-end to support and manage possible communications from external devices, such as commands issued by the teacher (tuning on a channel, setting a "parental control" level, …)

- a channel is a well-defined program/visualization which can make the screen act, for example, as a **peripheral display** [5]

- we have to decide if and to what extent the users (children and teachers) will be able to interact with the system, in particular about the type of desired interaction (active/passive, conscious/ unconscious, which level of attention is required to interact with the system, …)

- as Mattews et al. suggest in [5], there are at least 3 aspects we should consider: the level of **abstraction** to be used when extracting the features to be displayed on the screen, **notification levels**, which associates a level of attention required for each type of data/channel/event displayed (inattention, divided attention, focused attention). Finally also **transitions** between different data displayed within the same channel and also between different channels should be carefully considered, according to the chosen notification levels

- similar works, applied to the learning sciences domain, have been proposed, as far as I know, only by Saskia Bakker et al., but focusing on different devices (clocks, bracelets, lights and sound systems)

- a key feature of our system could be a **usage-tracking module** which logs heterogeneous data about the users' usage of the system over time, so that we can obtain some statistics and perform **data-mining** analysis to gain new insights in a more scientifically detailed way, rather than the usual qualitative evaluations conducted in most of the papers I read.

Related to what already stated, the following are some design questions that came to my mind while reading the papers:

- do we want the display to be more like an **ambient display**, thus avoiding to draw focal attention and instead using divided attention or more like a **notification display**, which is still a peripheral display, but tends to draw focal attention at key moments?

- type of interaction: will this be only passive through the channels, by only perceiving the peripheral display's activity or will it allow also for tangible interactions (e.g. aspects like an interactive whiteboard)?

- there could be one main selected channel displayed at a time, but we could allow for important external events to be notified in real-time in some way on the display: this would mean having an ambient display behavior, with some divided or focused attention required sporadically

- my feeling is that some switching from the background (periphery) to the foreground of the attention and viceversa would make the display more useful, if the channels are properly thought and designed. What are the needs of both children and teachers in this sense?

One of the key aspects, as I also read from the papers, is that to design and implement an effective system we need to have a quite clear understanding of the everyday routine in primary school classrooms and of the needs of both children and teachers. In this sense, the past experience of your research group will be very helpful in driving this research. Also, some further question and user-feedback along the way would be very helpful to keep contact with the real needs of the users (we are talking of user-centered design, indeed).