

# What's Your Lab Doing in My Pocket? Supporting Mobile Field Studies with SocioXensor

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## ABSTRACT

Mobile phones tend to go wherever people go. SocioXensor is an extensible toolkit that exploits this, in combination with the capabilities of current smartphones. It can capture objective data about human behavior and the context in which this takes place (e.g., location, proximity and activities such as communication), objective data about application usage and subjective data about user experience (e.g., needs, frustrations, and satisfaction). SocioXensor is a research instrument that allows social scientists to gain a detailed and dynamic insight into social phenomena and their relations. In turn, these outcomes can inform the design of mobile context-sensitive collaborative systems.

## 1. INTRODUCTION

Designers of mobile context-sensitive collaborative systems such as Live Contacts [5] face design issues like: which information sensed from a person and his context should be simply conveyed to other human users (using human intelligence to interpret that information), and which context information is reliable enough such that it can be interpreted and acted upon by computer systems? Simultaneously, researchers of such systems face issues like: how to evaluate a mobile context-sensitive collaborative system in everyday life?

SocioXensor is a concept developed in the FRUX project (see also [3],[4],[7]) for an extensible software toolkit for capturing objective data about application usage, human behavior and the context in which this takes place, together with sampling of subjective user experiences, at any time, in any location. The core idea of SocioXensor is not to bring the people to the lab, but to bring the lab to the people by using their personal mobile device as the primary data capturing device.

As an addition to existing data collection techniques, SocioXensor seeks to maximize the validity of data collected by focusing on in-situ data collection, and therefore, avoiding or minimizing problems of retrospective recall present in other self-report techniques such as surveys and interviews. SocioXensor can be more obtrusive than logging, but is typically less obtrusive than more rich direct observation methods such as ethnography or lab experiments. SocioXensor can collect data at times and locations and for larger number of subjects that would be impractical with ethnography and lab studies, while maximizing the chance that subjects exhibit their natural behavior in their natural context.

## 2. XENSOR

SocioXensor is one specific example of a Xensor System, which may consist of various elements (see Figure 1).

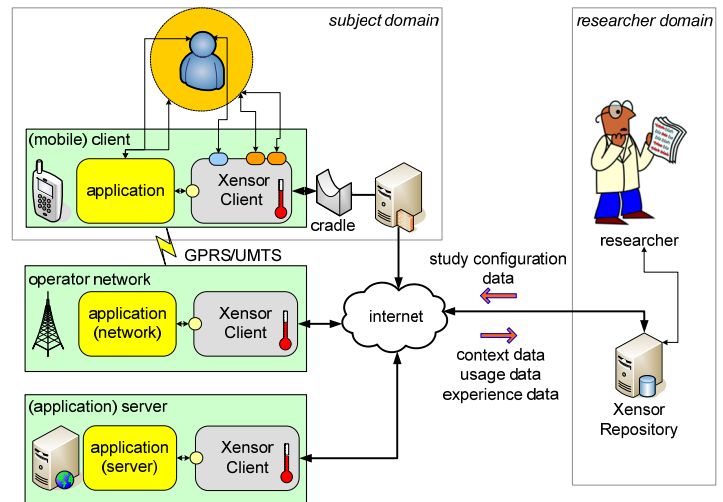


Figure 1. Xensor System high-level architecture

A Xensor Client allows for (third-party) Xensor Modules that collect data and interact with a Xensor Engine, which takes care of local storage and uploading data to a central Xensor Repository via appropriate media at appropriate moments (see Figure 2).

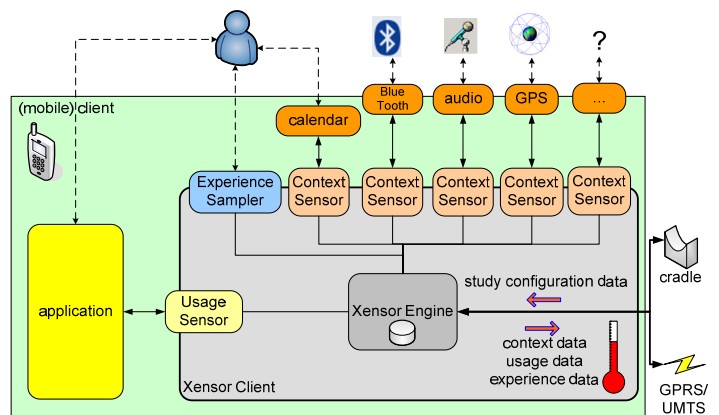


Figure 2. Xensor Client architecture

## 2.1 Data Collection with Xensor Modules

A Xensor System can support three types of Xensor Modules:

- *Experience Samplers*, which collect subjective information such as opinions and feelings, using an experience sampling procedure [2]. For example, by notifying the user of a sample (a survey with several closed questions defined by a researcher), according to a researcher-defined random schedule.
- *Context Sensors*, which collect raw, objective data about human behavior and context (location, proximity, communication) that is captured unobtrusively through device technologies on contemporary mobile devices such as smartphones (e.g., GSM, Wi-Fi, GPS, Bluetooth, audio microphone, call logs, calendar data). This raw behavior and context data can be used in later analysis to find relations with user experiences: for example, which raw location data predicts low tolerance for interruptions? Which location data predicts the relevance of other colleagues that might be able to help you given your current location? Is other context data more predictive?
- *Usage Sensors*, which collect raw, objective data about the usage of an application under study, ranging from low-level keystrokes and screens to high-level application events.

Tools currently exist to collect each of these types of data separately; some running on PDAs, such as the Context-Aware Experience Sampling system (CAES) [6], some running on mobile phones, such as ContextPhone [9]. However, as far as we are aware, no tools currently exist that can capture all of these three types of data from a single mobile device and that are extensible for third-party plug-ins.

## 3. SOCIOXENSOR DEMONSTRATION

At the conference, we demonstrate SocioXensor, a working prototype of a Xensor System that is focused on social phenomena and uses social context sensors. For SocioXensor we used the Windows Mobile 5.0 for Pocket PC operating system for the Xensor Client, running on small, portable yet powerful mobile devices, the .NET Compact Framework 2.0 as programming platform, SQL Server 2005 Mobile to store data collected on the device, which is uploaded at opportune moments to a Xensor Repository implemented on an SQL Server 2005 that allows a researcher to access the data. Late 2006, we expect to release SocioXensor under an open source license. In the demo, the following Xensor Modules will be demonstrated.

### 3.1.1 Basic Experience Sampler

A simple textual experience sampler that can be configured to ask one or more textual questions and answers, such as: “How interruptible are you right now” with answer possibilities “1 – not at all/2/3/4/5 – very interruptible”. Another question might be “Where are you now?” with answer possibilities “At home, at work, in a car, in a train, walking, cycling”.

### 3.1.2 Social Context Sensors

These include a communication Xensor Module that can be configured to log one or more of the following variables: phone conversations, SMS, E-mail, and a Bluetooth ID Xensor Module that can log the IDs of nearby Bluetooth devices.

### 3.1.3 Other Context Sensors

We will also demonstrate a GPS position Xensor Module that can be configured to log one or more of the variables: position, speed, and direction; a GSM cell-ID Xensor Module that can log the ID

of the GSM cell currently connected and a Wi-Fi Xensor Module that can log the ID of the access points currently in range. These context sensors are not social by nature, but by correlating the locations found, an analysis of proximity of subjects can be made.

## 4. ACKNOWLEDGMENTS

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