



# UNIVERSITÀ DEGLI STUDI DI SALERNO

DIPARTIMENTO DI STUDI E RICERCHE AZIENDALI  
(MANAGEMENT & INFORMATION TECHNOLOGY)

Dottorato Internazionale di Ricerca

Sistemi Informativi e Ingegneria del Software

XII Ciclo, Nuova Serie

Tesi di Dottorato in

## **Enhancing Ubiquitous Computing Environments Through Composition of Heterogeneous Services**

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Anno Accademico 2014-2015

## **Abstract**

In recent years the substantial advancements in Information and Communication Technologies enabled the development of original software solutions that can provide support to problems people face in their daily activities.

Among the technical advancements that have fostered the development of such innovative applications, the gradual transition from stand-alone and centralized architectures to distributed ones and the explosive growth in the area of mobile communication have played a central role.

The profitable combination of these advancements has led to the rise of the so-called Mobile Information Systems. Unfortunately, fulfilling such a type of systems is very challenging and several aspects have to be taken into account during the design and development of both the front and back ends of the proposed solution.

Within this context in this thesis we investigate two main aspects:

- 1) the elicitation of requirements and the design of usable mobile User Interfaces and
- 2) the information exchange in a back end combining heterogeneous services, more specifically services based on the standards of the World Wide Web (W3C) and Open Geospatial Consortium (OGC).

In particular, we develop a methodology to support the design of mobile solutions when usability requirements play a key role for the success of the whole system. We also present a solution for a seamless integration of services developed according to different standards with specific focus on the issue of proper management of geospatial metadata in a W3C standards-oriented infrastructure. The result of our investigation is an extension for a key W3C standard for the metadata retrieval to support OGC metadata.

The case study considered in our work is a Mobile Information System to be used by a community of farmers in Sri Lanka.