

# From General Services to Pervasive and Sensitive Services

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## INTRODUCTION

The choice, development and use of technologies has very varied impacts on the progress of human beings and nature. In some cases, this impact leads to a radical change in the context of users of a specific technology, both in social and cultural terms. This technological innovation or invention is labelled enabling technology and is mainly characterized by the rapid development of subsequent technologies, often present in several scientific and social fields.

In this sense, ubiquitous computing, pervasive technology and smart spaces represent enabling technologies which have conditioned the evolution of the current Information Society (IS). These ICT boosting the development of Internet of Things (IoT), wearable sensing, Cloud Computing, Smart Textiles, etc., which are transforming society and particularly changing the interfacing methods between services and user as well as their expectations from services. Such changes are related to arising of new kind of pervasive and sensitive service such as new healthcare and well-being personalized services or the final irruption of the Smart Home.

In this article such kind of services are defined in a comprehensive manner including their general objective, limitations, potential interrelationship,

etc., including the supporting literature and reported related work but not limited to a mere review of the available literature. This sense, sensitive services refers to new IS services that manage data that is not only based on the physical disposition of the user in regards to the environment (such as geographical position, interior positioning, or patterns of movement) but also related to more personal aspects of their physical state, psyche, or behavior patterns. On its part, pervasive services are those developed by using pervasive technology such as cloud computing, Internet of Things approaches and therefore can be defined as a delocalized and persistent ICT service that allows its users to access the functionalities it offers at any time or place. These definitions will be supported by an analysis of the evolution of services of the IS both from a socio-economic and industrial focus.

## BACKGROUND

The IS refers to the social model in which the means of wealth generation are based on the production, management and transmission of information (Sarell & Machlup, 1963). In the IS, information and knowledge are established as the main economic engine, giving greater importance to services over production and products. Infor-

mation and knowledge technologies (ICT) are an essential tool for the development of IS services. Their main objectives are the generation of knowledge and the exchange of information, through its encapsulation in the form of services to ensure its efficiency and accessibility to the citizen.

The services deployed in this society have undergone a continuous evolution to adapt to the needs of society and the specific characteristics of the technology used for its development. The incidence of these services in the IS goes beyond the technical field, and its evolution has been influenced, not only by the technology used in its development, but also by the socio-economic factors related to new forms of communication and global coexistence.

In (Achrol & Kotler, 2014) services are defined as the application of specialized competence by an entity through actions, processes and activities for the benefit of another entity or the own. This concept, in the context of the IS, refers to any set of features provided at a distance, electronically and by individual request from the recipient of the service (Directive 98/48/EC of the European Parliament and of the Council). To achieve this, ICTs are used as a means of developing the transmission, processing, and storage of the data associated with it.

In contrast to a specific product, the services deployed in the IS are specified at the time they are required by the user. The specifications or design requirements of the services can and must be defined a priori, but their implementation, deployment and behavior are subject to their use. This means that the services are tailored to the needs of the moment when they are required. This situation requires that the users can control and understand the elements involved in the use of the service at the time in which they are accessed, regardless of the technical complexity and underlying technology. In this way, the IS offer their users increasingly complex and useful services whose efficiency and effectiveness is subject to the relationship of communication between them. Given the complexity of nuances in many existing

services deployed, a detailed study and design of all of the elements of the service is necessary. Within these elements, the communication relationship between users and services is of particular importance for two basic reasons related to their implementation in society and the management of the inherent complexity of these services. On the one hand, the ever increasing inclusion of these services in the daily lives of people means that these affect more intimate and personal aspects of users, which could generate rejection or fears that did not exist initially. On the other hand, a more complex functionality that addresses closer needs to the user implies an increased degree of service sophistication and interconnection.

To better understand the importance of the relationships between users and the services of the IS it is necessary to analyze its evolution, from a more focused approach in the management of the information until a conception aligned with enabling technologies such as ubiquitous computing, pervasive technology or intelligent environments.

### **The Evolution of Services in the Information Society**

As has already been mentioned, the evolution of services in the IS has been marked not only by the ICT used in its definition, but also by the needs and wants of the citizens that make up the society of the availability of the basic resources needed for its proper development.

Throughout this section, the evolution of services in the IS will be presented from two perspectives. The first analyses said evolution from a socio-economic focus in order to understand how key aspects of today's society and its needs have influenced the development of these new services in the IS. The second presents a view of the evolution of development efforts and investments made by the big ICT companies over different sectors of society in order to create new services in the IS.

Although development efforts for these services and their evolution are currently oriented

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