

# Framework for Intelligent Service Adaptation to User's Context in Next Generation Networks

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In the Information and Communication Technologies (ICT) world the term "Context" is usually employed as a reference to the surrounding circumstances of a given user, involving all kinds of measurable conditions across a variety of domains: environmental (temperature, humidity, noise volume, etc.), biometric (heart rate, body temperature, etc.), movement and position (speed, acceleration, location, etc.), communications (SMS messages received, incoming calls, etc.), social (proximity, activity, contacts, tag line), etc. With the advent of pervasive computing, the information society is increasingly permeated by a myriad of sensing devices, including sensor networks, mobile devices and smartphones, social Web services retrieving information from users, etc.

The result is that there is a huge amount of information about users available in the networks. This information is potentially useful for a wide array of applications; most notably, context data is starting to be used by intelligent applications to modify their behaviour according to the user context, giving birth to a computing trend that has received the name of "Context Awareness". An easy example is the smart configuration applications (such as Tasker or Locale for the Android platform) that modify the configuration settings of a smartphone depending on several variables (location, battery charge, etc.). But these applications are only starting to scratch the surface of the potential of "Context Awareness": the application of data mining and Artificial Intelligence (AI) techniques to massive context data will open the door to a never before imagined intelligent user profiling. This has not to be understood only as a kind of "big brother" user tracking application, but as a way to let personal devices and services learn about user preferences and conditions. For instance, intelligent agents like the popular Siri of iPhone 4S, will be able to better interact and adapt their reactions to the user's preferences, preferences that the user might not even be conscious of, but might be implicit in his or her conditions and tracked behaviour.

However, this level of Context Awareness can not be achieved with the current state of context sources. These sources (smartphones, sensor networks, online Web services, etc.) are fragmented and do not comply with any standard. An application wanting to retrieve the complete context picture of a user will need to specifically poll all of them, using different interfaces and formats, to retrieve the required data. This is not efficient by any means.

And at this point is where this paper, "Framework for Intelligent Service Adaptation to User's Context in Next Generation Networks", jumps in. It presents a novel architecture for centralized management and analysis of context data that takes advantage of Next Generation Networks (NGNs), the new intelligent communication infrastructures that are being put in place by telecom operators. This architecture defines a protocol for controlling and interacting with context sources and context consumers, so it is capable of retrieving and integrating all meaningful context data from a user across the different sources, and make it available to client services and applications both inside and outside the telecom operator infrastructure, always. Additionally, this architecture is capable of performing AI based data analysis over the retrieved data to extract higher-level information, and serve this as well to interested applications.

This architecture not only facilitates retrieval and access to context data, but also makes life easier for users, since they are able to grant appropriate access rights to different entities in a single point, and they do not need to modify different preferences for their different context sources. Privacy management then becomes also easier both for users and applications.

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