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Special issue on advanced technologies enabling adaptive and collaborative smart systems

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Editorial for Future Generation Computer Systems

Special Issue on *Advanced Technologies Enabling Adaptive and Collaborative Smart Systems*

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The core ideas of service-based, knowledge-based and multi-agent systems more and more characterize current architectures of computer systems, which can so benefit of properties such as agility, adaptiveness and support to cooperation. These properties enable to address issues such as uncertainty of highly dynamic situations, complex problem solving and management of large quantities of data, or flexibility in facing critical states emerging in the controlled environments.

The focus of this Special Issue is on the *modelling and technological solutions* that exploit *agile*, *adaptive* and *automatic reconfiguration* characteristics, enabling to address unexpected circumstances and evolving scenarios in *smart systems*, namely in a sensor-monitored ambient where events happen at run time, which must be understood, handled, solved, in case they generate risks or problems, and managed for the huge quantity of information they are usually immersed in.

The solutions analysed in *this Special Issue* stem from the core ideas of *service-oriented* and *adaptivity* paradigms in software systems, and in the *semantic web* and in *multi-agent* frameworks. Models and technologies in these areas have always played a vital role in leveraging *new smart software applicative solutions* for that exhibit agility and adaptive features. Moreover, support to cooperative work and the semantic paradigm are currently enabling to address *uncertainty* in highly dynamic situations in quasi-real time or anyway in a way that supports interventions in face of (critical) events that may arise in smart systems.

Not yet having a sound definition, the term *smart system* currently constitutes an umbrella of models, methods and emerging frameworks proven *flexible* and *efficient* in taking *autonomous decisions*. The basic idea is to combine different technologies to implement systems endowed with enhanced autonomy, and supporting flexible collaboration and decision making by human actors.

In particular, with the development of technologies such as cloud computing, industrial wireless networks, big data, smart sensors, and security and safety tools, software applications for smart systems are attracting an increased interest from the academia, the governments, and the industry areas worldwide. The reason is their ability in detecting and adapting their behaviour to dynamic changes occurring in the environment.

From a time viewpoint, the advent of smart systems has been foreshadowed by the appearance of self-adaptive applications, defined as components able to react and adapt to their run-time context in dynamic ubiquitous computing scenarios. This adaptation postulates *context-awareness*, which not only relates to *functional* requirements and constraints, but also to *non-functional* aspects related to architectural or usage constraints. The aim is having a strong influence on the effectiveness of the adopted solutions (timeliness, performance, and so on) as well as on issues, such as user acceptance of such applications.

Hence, although necessary, context-awareness is only one of the many prerequisites for smart systems, others being a *high and good-quality user acceptance*, good *performance*, acceptable *complexity*, data *privacy* protection, to mention a few, pivotal success factors.

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