



## Modeling architecture for collaborative virtual objects based on services

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### ARTICLE INFO

#### Article history:

Received 23 July 2010

Received in revised form

24 March 2011

Accepted 27 April 2011

Available online 7 May 2011

#### Keywords:

Virtual object

Web services

Mobile services

Internet of things

Device Dependent Temporary Services

(DDTS)

### ABSTRACT

With technological advances there are many physical objects that are designed in digital format, some examples are: books, agendas, tickets, etc. One of the characteristics of digital objects is that each type of object has its own format, in most cases each object type can only be interpreted by a particular application, so will have problems to be interpreted. Internet of things (IoT) promotes the integration and communication between physical objects, including digital objects on the IoT can automate and streamline many tasks. The absence of common format for digital objects also causes problems of interaction and communication. There is no standardized way to obtain the actions or services associated with the digital object, which makes it difficult for these digital objects to interact and integrate in a generic way with other applications, devices or embedded systems. Based on the problems identified in this document a proposal is detailed in search for a single structure and for the construction of any digital object. The validity of the approach has been verified through a prototype system working with real appliances.

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### 1. Introduction

The main idea in the internet of things is that any “thing” or object, conveniently tagged, may be able to communicate with other objects equally tagged through internet or any other protocols. These objects, which are part of the net, may contain small chips or embedded systems, depending on their purpose (Kranz et al., 2010). Nowadays, there are many objects in the home, office and industry that contain embedded microcontrollers. One of the most important reasons for embedding computers to everyday appliances is that they make the appliance easy to use while giving them new features that enhance their values (Borriello and Want, 2000). The objects included within the internet of things are so diverse: household items and electro-domestic, industrial equipment, vehicles, including supermarket products and medicines. Anything can be tagged to be part of the internet of things (Kortuem et al., 2010; Lu et al., 2008).

Possibilities of the internet of things to make people's life easier and to automatize many of our current tasks are huge, for example: smart fridges that communicate with users when a product expires, traffic signals networks able to communicate and be self-regulated, clothes can monitor people and communicate their status via mobile phone, etc. There are lots of practical applications and all of them are seen with a common basis: “things” are communicating with “things” or persons (Global, 2008).

As technology advances many physical objects begin to be delivered in digital format. Examples of them can be seen in: books, maps, e-tickets, plane tickets, agendas, contact cards, agendas, electronic purses, etc.

Not all new digital objects that are used today are based on physical objects, many times these digital objects are new concepts designed for any specific task or information encapsulation. This document defines the term “virtual object” as a digital element that has a specific purpose, is comprised of a series of data and can perform actions. The interaction between virtual and physical objects can also be very useful to optimize tasks and make life easier for people, especially in a world that tends to introduce embedded systems and networked more and more ordinary elements (internet of things); for this purpose the virtual objects must be able to communicate and integrate with other applications and electronic elements

Observing the use and the behavior of virtual objects at present, it perceives that there is no standard format or recommendation to standardize their use. There are no mechanisms to manage generally virtual objects, interpret, store, etc. The management of virtual objects is usually done by specific applications that know the exact format of the object. Problems coming out of this lack of standard format are the following:

- Difficulties for decode: devices with no specific applications to decode the virtual object will not be able to process it. For example, when transferring a contact card from a mobile phone to another, it is possible that the receiver phone cannot decode the information that has been received, if the device does not have the

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