Chapter 20
Dashboard Services for Pragmatics-Based Interoperability in Cloud and Ubiquitous Manufacturing

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ABSTRACT

The real Cloud and Ubiquitous Manufacturing systems require effectiveness and permanent availability of resources, their capacity and scalability. One of the most important problems for applications management over cloud based platforms, which are expected to support efficient scalability and resources coordination following SaaS implementation model, is their interoperability. Even application dashboards need to easily incorporate those new applications, their interoperability still remains a big problem to override. So, the possibility to expand these dashboards with efficiently integrated communicational cloud based services (cloudlets) represents a relevant added value as well as contributes to solving the interoperability problem. Following the architecture for integration of enriched existing cloud services, as instances of manufacturing resources, this paper: a) proposes a cloud based web platform to support dashboard integrating communicational services, and b) describe an experimentation to sustain the theory that the effective and efficient interoperability, especially in dynamic environments, could be achieved only with human intervention.

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1. INTRODUCTION

It is generally accepted that emergent cloud computing paradigm and its rules, strengths and opportunities, reinforces nowadays Information and Communications Technology (ICT) impact in Manufacturing. The efficient capacity to get a job done when it is needed is again a commandment. But if the quality is assured, who did the job or how it was really done is not as critical as before, indeed. Virtual relations between customer and provider arrived, brought by cloud based services.

If on one hand the timely need for resources (material, persons, processes, etc.), and on the other the need of their interoperability, are the essential requirements to get a real cloud and ubiquitous manufacturing, the system's effectiveness is dependent of users direct participation and co-creation.

If the cloud assures the resources supply (Charlton, 2008), and advanced dashboards (Yigitbasioglu & Velcu, 2010) of "integrated" (but not interoperable) services sustain and improve their management, the heterogeneity (different specification, support technology, etc.) of those services represents the main challenge for their efficient technological interoperability (Fu, Gong, & Chen, 2012).

Thus, to overcome this evident technological limitation or incapacity, the real context and the user's (as human) own individual perspective must be considered. Pragmatics represents such *add-on*.

To complement the emergent and required Rich Internet Applications (RIA) technologies inherent to Web 3.0, and to take advantage of the new technological platform capacities, where more intelligence and human experience participation (Harris, 2008) is required, new communicational services must be efficiently integrated in the system's user interface to allow human-to-human interaction and to achieve co-decision.

This paper contributes with further investigation of the cloudlet architecture for a dashboard having integrated Pragmatics oriented services (Ferreira et al., 2012), towards user (human) alignment and effective cloud and ubiquitous manufacturing system.

2. INTEROPERABILITY AND UBIQUITY

Besides the on-demand self-service model, the reduction of costs, the improvement of accessibility, the multi-tenancy, and many others technological challenges that can be identified with cloud computing, its flexibility and reliable and scalable processing capacity in particular, made it a potential successful platform to promote the emergence of new business paradigm or opportunities, and to promote change existing business process (Group, 2010).

The Manufacturing, as a traditional business activity that requires timely and sufficient quantities of resources (material, machines, workers, etc.), that behaves under complex and "heavy" production process, has been changing and transforming in an efficient and dynamic activity, with agility to react to continuous change of market demand and with the capacity to be much more competitive. According to the literature, ubiquity represents existence and sufficient availability, anytime and anywhere, which can be seen on manufacturing as the capacity to produce sufficiently, knowing that the necessary resources exist.

The literature emphasizes too the (virtually technological) unlimited capacity (scalability, processing, etc.) achieved with Cloud Computing (Charlton, 2008) and the Ubiquitous Information Systems (UIS) that allow permanent services availability and use. To have systems that support a Cloud and Ubiquitous Manufacturing (CUMS), both properties must be present.

Ferreira et al. (2012) emphasized the potential of the cloud and systems that grant Ubiquity as relevant technological supporting "tools" to nowadays continuous business models changes.