Cloud Engineering approach in business innovation

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I. POSTER INTRODUCTION: CLOUD ENGINEERING

The research in the area of Customer Relation Management (CRM) applied to two prototype studies on learning and mobility offers an opportunity to experiment new multimedia data management, data analysis, and distributed collaboration. Software engineering practices based on cloud technology techniques acquire from the Web what is needed for rapid prototyping and to satisfy the needs of customers for market validation of pricing policies and marketing strategies.

This approach allows to specify the projects’ concepts by reaching stakeholders of needed Information & Communication Technologies (ICT) to implement a prototype relying on software components available elsewhere. Two sample cases are presented to clarify this cloud-engineering approach:

1) Program for Recovery Insufficient Grades in High-School (PRISC);
2) Sustainable Mobility through Social Mobility (SM²) to reduce dependence on one’s owned cars to satisfy mobility needs.

The PRISC strategy focuses on the learner and on how proficiency is assessed through grades. The action steps are:

- understanding is focused on the students’ study on schoolbooks;
- assessment is delegated to exercises and tests managed on screens of mobile telephones or PCs in an interactive Web environment;
- students with excellent grades act as tutors by exploiting social networks.

The SM² strategy focuses on exploiting the empty seats available in most cars running in metropolitan cities with air pollution problems. Key features:

- direct negotiation via mobile devices between car drivers and ride seekers;
- short range contacts insuring prompt satisfaction;
- GPS ride surveillance.

From the standpoint of a University environment, the attention that Cloud computing receives on scientific publications [1] and on the daily press as well, indicates a major potential for business innovation besides job opportunities for young graduates once a win-win situation is established which could leverage on cloud technology techniques to acquire on the Web what is needed for rapid prototyping of business models concepts, while reducing time-to-market to satisfy the needs of customers.

Many companies provide Cloud technology: CA Technologies, IBM, Microsoft, Google, Seeweb are those we could approach. The specific focus on CRM brought to select the academic license granted by SFDC Inc. (www.Salesforce.com) for this prototype implementations because of its 11 years experience gathered in offering the “Sales Force Automation” solution in web-based modality and on-demand. The functionality covering “Service and Support Management” is of specific value for our studies allowing us to practice SaaS (Software as a Service). While the access to the programming infrastructure and the services of hosting and administration allows to develop PaaS (Platform as a Service).

The development programming environment refers to a Java language named APEX which allows to write code for any application beyond the initial CRM objective.

II. PROGRAM FOR RECOVERY INSUFFICIENT GRADES IN HIGH-SCHOOL (PRISC)

High School Education is a major concern for Governments since economy globalization and technological innovation in industrial processes require staff and managers able to anticipate unpredictable market changes. At the same time the economy recession and lower government budgets force to prototype new educational formats where ICT and social networking could make education more effective and profitable.

To deliver an overall better education in High-Schools requires a coordinated action on the stakeholders: teachers, students, textbook publishers, school administration board, parents, laboratories and their equipment [2]. Since PRISC strategy focuses on the learner and on how proficiency is assessed through grades, the learners involved in PRISC action are both those with bad grades and those with excellent grades who are meant to act as tutors.

At present bad grades recovery happens either with additional classroom-based teaching organized by the School and free of charge to students, or by private action where parents look for teachers (or university students) for private tutoring usually paid cash and with no receipts.

In its initial phase, PRISC focuses on a few subjects: Mathematics, Physics, Computer Science. The action succeeds when a student with bad grades in specific subjects succeeds in recovering them in order to proceed to next higher level class.

All CRM procedures are managed on the cloud. The resulting system is inherently distributed and the central management coordinates the outsourced components (users do not know where data and procedures are stored). The PRISC coordinator interacts with a set of web-services provided by the cloud interface. He doesn’t know directly the actual students (both with insufficient or with excellent grades). He only interacts with standard tools reckoning the student activities and with a standard platform to access and store the teaching materials. Thus there is no need for any venture capital investment, since
the financial balance only comes from a pay-per-use fee that is tightly commensurable to the benefits of PRISC activity.

In particular:

a) the study on text-books of specific topics not well understood involves cooperation with specific text-book Publishers to edit relevant exercises related to their books;
b) modern ICT digital video-interactive communications over screens of mobile phones or PCs involves Mobile Telecommunications Carriers

c) the web-based support to a learning community (where students with good grades help other students to recover from bad-grades) involves Social Networks platforms
d) implementation involves partnership with Education stakeholders at national and local government both in public and in private sectors.

III. THE SM² (SUSTAINABLE MOBILITY THROUGH SOCIAL MOBILITY) PROJECT

In metropolitan areas with air pollution problems the SM² strategy focuses on exploiting the empty seats available in most cars. The distinguishing strategy through which SM² plans to hit its target is the raising up of a Social Mobility community capturing the consensus of the customers thanks to widespread ICT instruments such as Internet and GPS on the one hand and socio/economic motivations on the other [3].

The approach is distributed at a great extent, with cloud computing acting as an ideal middleware. Indeed, the community autonomously emerges from the interaction of commuters without any previous direct contact. They simply interact through an id that attests their mobility in the same geographic range and requires information tools in the cloud to match them on the empty seats on other commuters’ cars.

The model is intrinsically distributed since the managers of the transactions are exactly the actors who access remote resources through a portal installed through APIs on their mobile terminals. This will allow to achieve the following basic goals:

a. Extemporaneity of the transaction. We assume that users wait for maximum 10 minutes between when they plan to move and the planning of an alternative ride. Otherwise they will decide to move with their own means.
b. Efficiency of the transaction. Operational and technological efficiency are needed to guarantee the above time limit.
c. Reliability of the transaction. Both the reliability and the security of the service need to be considered together with emergency procedures in case of anomalies.
d. Green mobility issues require the monitoring of energetic and ecological efficiency as keen quality parameters.

The GPS availability allows to subdivide the community in users groups by location and consequently by time-range so that we could combine demand and offer in an optimal way both in terms of quality of the services (QoS) and of energetic consumption. Key implementation aspects are:

1) a distributed information support for the formulation of the ride requests and offers. The peripheral hardware will be constituted by new generation mobile terminals endowed with the Android operative system. An important part of this support will be the message ciphering and anti-intrusion systems and the transaction sampling and log compacting systems.

2) a cloud database for the collection of the requests, their interface with the availabilities, and finally the dispatching of the service orders to the transport suppliers. The DB should also contain the personal data of the community members with their preferences profile and credibility, updatable on line. The DB will store the traces of the transactions, including GPS traces, for a time sufficient for any security control need, but not exceeding the limits of the privacy of the members.

3) the design and implementation of the security system guaranteeing both the passenger and the driver in a non invasive but sufficiently robust way. Main points are:

3a) the transaction enrolment from the driver-passenger assignment to the end-of-transport message by both the actors. The transaction will be followed through the service messages (call – offer – assignment - starting point agreement - end-of-transport message) and the GPS traces of the driver and of the passenger compared with the optimal routes suggested by satellite navigators

3b) a library of rules for the agent system constituted by passenger, driver, and central server. With this library we will face both unpredictable events caused by traffic and real events linked to any anomalous behaviour of either the passenger or the driver. We will use fuzzy rules to be calibrated both in batch mode and online with neuro-fuzzy learning mechanisms[4].

IV. CONCLUSIONS

The lesson learned is how to deliver leaner, faster and more agile services to users – students and citizens - alongside with business stakeholders – Schools and Municipal Transportation companies – which are under pressure to make their business processes cheaper and more responsive to the customer’s environment.

At present these two case studies simply constitute candidate test sites for Social Clouds instances which must be engineered in order to check the effectiveness of the benefits promised by their ecological paradigm [5].

The main benefit lies in the possibility of enabling a fast prototype implementation, in time to report results of these studies to the visitors of this poster.

REFERENCES