Multi-channel, multi-objective, multi-context services: The GLUE of the smart cities learning ecosystem

Mar Pérez-Sanagustín
Telematics Engineering Department, Universidad Carlos III de Madrid, Av. Universidad, 30, E-28911 Leganés, Spain {mmpsanag}@it.uc3m.es

Ilona Buchem
Beuth University of Applied Sciences Berlin, Luxemburger Str. 10, 13353 Berlin, Germany {buchem}@beuth-hochschule.de

Key-words: smart cities learning, glocality, ecosystems services

In this position paper we argue that multi-channel, multi-objective and multi-context services are the necessary GLUE for connecting and guiding the complex technology-enhanced learning ecosystems in smart cities. Our position is based on the discussion around how digital media change our perception and experience of the local in terms of glocality. We argue that there is an urgent need for GLUE services to support glocal, reciprocal and multi-episodic learning in digital urban spaces.

Cities are complex, networked spaces where people work, learn, play, organise in communities, do shopping, go running or simply have a coffee with their friends. These activities involve daily experiences that are strongly dependent on the nature of a specific locality. With the increasing availability of smart devices in combination with other electronic advances, technology has occupied the urban space transforming cities into smart places. Cities have become complex organic ecosystems supported by a technological infrastructure that is transforming the way we engage with the city1. Within this urban space we can connect anytime and anywhere to remote places, resources and people when engaging in diverse activities. We extend the boundaries of our experience by using digital media as we cease to see our physical surroundings as the only centre and source of our experience and identity. The connection with the global also changes our relation to the local. We can choose our own networks for membership and level of engagement in each network to shape our urban experience2. In smart cities, we live in glocalities, where local and global co-exist.

There are as many glocalities as there are people. Each glocality is unique and is constantly changing and evolving, influenced by the global and the local. What happens is a fusion of local and global experiences and identities. We process information from the city with information from our global identity generating urban conversations that influence other glocalities. We are lifelong learners that are permanently learning with and within the media-networked city. As we continuously create and modify our “multiple, multi-layered, fluid, and endlessly adjustable senses of identity” (Meyrowitz, 2005), the key question becomes: How can we use technology

to support our learning and making sense of distributed knowledge between the global and the local diversity, while participating in an ever evolving, lifelong learning process within smart cities ecosystems?

Glocalities evolve as people use technology to build their learning ecosystems through which they can immerse into the continuous flow of information. Diverse agents compose such immersive urban learning ecosystems, e.g. city institutions as information providers, citizens as collectors, producers and sharers of information, urban elements as local sensors for providing and collecting information. All these agents can be technologically enhanced to participate in urban conversations. What is needed are services which interconnect all agents and orchestrate the ecosystem, both integrating technologies involved and mediating the information flow. We argue that three key attributes are necessary for a service to act as a GLUE service mediating conversations between the agents of the urban ecosystem and transforming them into a learning process. As learning in smart cities becomes glocal, reciprocal and multi-episodic, the challenge is to design a service catering for the evolving nature of individual and connected glocalities. A GLUE service is:

(1) **Multi-channel:** To assure an egalitarian and democratic dialogue between agents of the urban ecosystem, GLUE services have to support a multi-directional conversation through multiple channels to allow agents to create and choose different identities and engage in diverse communication patterns. Supporting multi-channel conversations allows agents to flexibly mash evolving channels and identities while participating in collective knowledge construction.

(2) **Multiple-objective:** To cater for individual idiosyncrasies, GLUE services have to support diverse objectives, which guide our multiple learning paths. As learning objectives emerge from conversations between agents in the ecosystems and learning itself becomes multi-episodic, we tend to struggle with multiple learning tools and interfaces. Supporting multi-objective learning paths means guiding agents in building these paths by connecting multiple sources and technologies.

(3) **Multi-context:** To support using urban elements as resources in which the digital information is combined with the physical space, GLUE services have to relate virtual and physical to transform the global and the local into glocal. As both physical and virtual spaces act as filters contextualising information, supporting multi-context conversations between agents in the urban ecosystem is a challenge for creating glocalised learning scenarios in smart cities of the future.
Figure 1. The services for a smart city need to be multi-channel, multi-objective and multi-contexts.
Authors CVs

Dr. Mar Pérez-Sanagustín
Personal Web Page: http://mperezsanagustin.wordpress.com
Universidad Carlos III de Madrid

Mar Pérez-Sanagustín is a Doctor in Information and Communication Technologies since July 2011 by the University Pompeu Fabra, where she obtained the *cum laude* grade. She has also a Master in Information and Communication Technologies and is a Computer Science engineering by the same University. Currently, Mar is a researcher at the Gradient Lab of the Gradient del Grupo de Aplicaciones y Servicios Telemáticos (GAST) at the Universidad Carlos III de Madrid (UC3M) and teacher of the department of Telematics Engineering. Mar has participated as a researcher in several I+D national and international projects, in which she has had the opportunity of exploring and experimenting the potentiality of the mobile and web technologies for supporting learning. Her research focus on the study of the mobile technology in combination with web applications to enact learning scenarios which combine activities in and beyond the classroom in order to build the bridges between formal and informal education. Recently, Mar has become an specialist in the development of mobile and web apps to facilitate the enactment of interactive experiences based on tags (QR Codes, RFID…) and she is currently collaborating with some museums for the firsts evaluations. Some of the topics on her research are CSCL, orchestration, blended learning, smart cities, learning in formal and informal spaces and media literacy.

Prof. Dr. Ilona Buchem
Personal Web Page: http://ibuchem.wordpress.com
Beuth University of Applied Sciences Berlin

Ilona Buchem is a visiting professor for Digital Media Studies at Beuth University of Applied Sciences in Berlin, Germany. She obtained her PhD in Educational Sciences at the Humboldt University Berlin (Germany) and her MA in Applied Linguistics at Warsaw University (Poland). She was also studied Media and Communication at Concordia University (WI, USA). Her research and teaching focus on the intersections of digital media and society. She is interested in how digital media, especially social and mobile media, change our current practices in education and business. Some of the key topics on her research and teaching agenda include digital diversity, digital identities, media and creativity, serendipitous learning and microblogging, online participation, online facilitation, online communities, mobile learning, ePortfolios and personal learning environments. Ilona Buchem has participated in a number of national and international projects and is a member of ePortfolio Initiative Berlin, member of the organising committee of the international conference on Personal Learning Environments - The PLE Conference, and the author of a number of publications on technology-enhanced learning.