The IntelCities Project, part 2

The Community of Practice as a virtual organisation: innovation seeking and knowledge creating

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Smart Cities Research Brief
No.8

Abstract

This research brief is the second on the IntelCities Community of Practice (CoP) and outlines the integrated - innovation seeking and knowledge creating - model of eGov services developed under the shared enterprise of the organisation's capacity-building activities, co-design actions, monitoring and evaluation exercises. This offers a synopsis of the information technology (IT) adopted by the IntelCities CoP to develop the organisation's e-learning platform, Knowledge Management System and digital library as a set of semantically-interoperable eGov services supporting the crime, safety and security initiatives of socially-inclusive and participatory urban regeneration programmes.

1 Introduction

The notion of the intelligent city as the provider of electronically-enhanced services has become popular over the past decade or so (Graham and Marvin, 1996; Mitchell, 2000). In response to this growing interest in the notion of intelligent cities, researchers have begun to explore the possibilities of using Communities of Practice (CoPs) as a means of getting beyond current 'state-of-the-art' solutions and use the potential such organizations offer to develop integrated models of e-government (eGov) services (Curwell, et.al, 2005; Lombardi and Curwell, 2005).

The IntelCities [1] CoP was made up of research institutes, information, communication and technology (ICT) companies and cities, all collaborating with one another under the leadership of Manchester and Siena and reaching consensus on how to develop integrated - innovation seeking and knowledge creating - models of eGov services. Made up of both open source software groups, experts and lay people, the IntelCities CoP is unique in the sense its network provides an example of a virtual organisation set up to be innovative and creative in managing the learning needs and knowledge requirements of a technological platform.

An earlier research brief [2] described the structure and evolution of the CoP. This paper focuses on how the CoP approached the design of the e-learning system to support IntelCities. It begins by examining the capacity that the CoP built to co-design an integrated model of eGov services and IT underlying the eCity platform developed as an intelligent

[1] *See http://www.intelcitiesproject.com*

[2] *The IntelCities Project, Part 1: Creating a Community of Practice*

solution (innovative and creative) for the virtual organisation's learning needs and knowledge transfer requirements. The brief then goes on to reflect on the step-wise logic adopted that have been adopted to meet the innovation and creativity challenge which the learning needs and knowledge transfer requirements of such virtual organisations pose. From here the e-learning platform, knowledge management system and digital library developed for such purposes shall be outlined.

Having done this, attention turns to the features of this platform, management system and library and the semantically-interoperable qualities of the learning, knowledge and repository services this offers shall be reviewed. From here the examination turns attention towards a review of how the learning, knowledge management and digital library services now available as eGov services are integrated into the eCity platform and made available over the web. This turns attention to what is termed the eTopia demonstrator developed to illustrate the functionality of the semantically-rich eGov services in question. This term is borrowed from Mitchell's (2000) account of intelligent cities as e-topias and as organizations that are: 'SMART', lean, mean, green software systems, driven by networked communities which are virtual (see, Deakin and Allwinkle, 2007; Deakin, 2009). Those types of organizational characteristics which the author would add are built on the learning needs, knowledge management requirements and digital libraries of electronically-enhanced government services that are available on the eCity platform as a pool of integrated eGov services.

2 The integrated model of eGov services

Figure 1 on the next page outlines the integrated eGov services model developed by the CoP. At the front-end there are a range of eGov services under development, highlighted as social inclusion, participation and regeneration and shown in terms of the middleware integrating them between the front-end presentation tier and back-office core interoperability and infrastructure service layer of the eCity platform. This also illustrates the services located in the back-office and the relationship this develops between the organisation's e-learning platform, Knowledge Management System (KMS) and digital library. This shows that it is the middleware of the eCity platform which integrates the front-end delivery of government services to citizens with the back-office business functions.

The illustration also shows that it is the middleware which in turn provides the opportunity for the e-learning platform, KMS and digital library making up the back office functions, to do the same and become an integral part of the eCity platform, supporting the pool of eGov services which are available for citizens to access at the front-end. This integration of the e-Learning platform, KMS and digital library into the middleware and use of it as the eCity platform supporting the presentation of eGov services to citizens at the front-end, is the challenge the IntelCities CoP has set out to meet and sought a solution for.

3 The IT underlying the intelligent city solution

The main challenge for the IntelCities CoP has been that of finding a solution which has the intelligence cities need for the information technology (IT) underpinning the presentation of eGov services to be extensible, flexible and also have the capacity to carry existing local government legacy systems. The Services Oriented Architecture (SOA) of the enterprise-wide business model adopted as the joint venture vehicle for such an 'intelligent solution' meets this challenge by offering the IntelCities CoP a distributed, web-based and extendable access system. This in turn offers cities the opportunity to build a web services enabled platform of eGov services, with XML IT utilisation and SOAP communication.

An important element in the initial system design relates to the use of the Unified Modelling Language (UML) and Rational Unified Process (RUP) methodology used for developing the integrated model of electronically-enhanced government (eGov) services. This allows for the development of complex 'N-tiered' systems and the possibility of cities hosting eGov services on e-learning platforms, KM systems and digital libraries utilising the intelligence such IT offers.

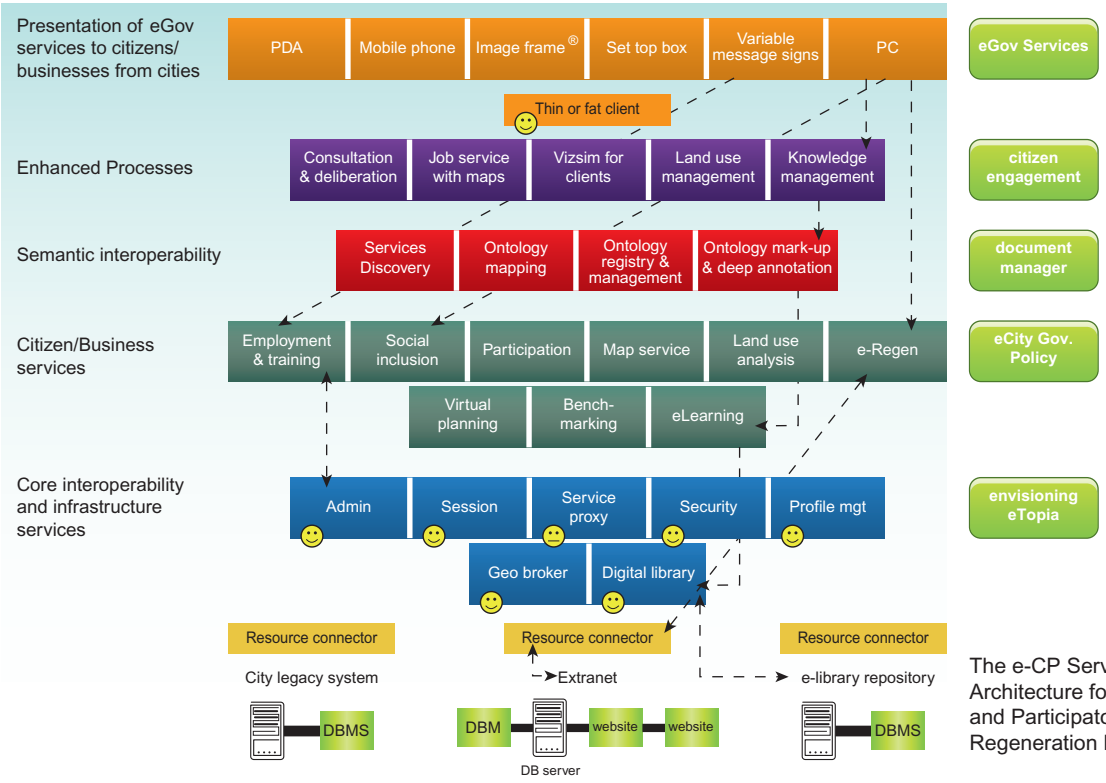

Figure 1

Integrated eGov services model

The e-CP Service Oriented Architecture for Socially-inclusive and Participatory Urban Regeneration Programmes

This has the advantage of offering a homogenous platform solution supporting the development of specific service applications meeting the e-learning needs, knowledge transfer requirements and capacity building commitments of the IntelCities CoP. It also manages to do this while leaving open the possibility of sharing services developed by other organisations not yet integrated into the eGov services model.

4 The search for an intelligent solution

The search for an intelligent solution to the e-Learning needs and KM requirements of the eCity platform progressed by applying a stepwise logic to the challenge it pose the IntelCities CoP. This has taken the following form:

- a survey of user learning needs;
- analysis of the knowledge requirements;
- review of learning and knowledge services leading city portals provide;
- benchmarking of existing e-learning platforms against the user's knowledge transfer and capacity building requirements;
- selecting the e-learning platform able to meet these requirements and develop as a KM system supported by a digital library;
- integrating the aforesaid into the IntelCities middleware as a platform of eGov services delivered to citizens at the front-end.

Following this approach meant focusing attention on the underlying pedagogical issues, the competencies, skills and training requirements of IntelCities. The next step involved a review of the learning services leading city portals offer as

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legacy systems and benchmarking of the e-learning platforms these systems are based upon against the knowledge transfer and capacity building requirements of the IntelCities CoP. Here the learning services of five leading city portals were reviewed. These included the learning services provided on the city portals of: Edinburgh, Dublin, Glasgow (Drumchapel), Helsinki (Arabianranta and Munala) and Reykjavic (Garoabaer).

The review found:

- all the city portals provide learning services for citizens;
- these portals provide citizens with a community grid for learning;
- much of the data available to the community is informative, telling citizens about learning opportunities in their neighbourhoods and providing links to the service providers;
- while being used by up to 10% of the population and offering free email and storage, most of the services provided by the city portals are insufficiently engaging for citizens to use them as grids for communities to base the development of learning partnerships with cities.

As legacy systems, the review found these e-learning platforms were insufficient to meet the knowledge transfer requirements of the IntelCities and needed to represent the point of departure for the CoP.

However, on a more positive note, the review made clear the focus of the IntelCities e-Learning platform should be the needs of the citizen: their knowledge requirements and the technology adopted to deliver this ought to break with the tradition of existing city portals, be more socially-inclusive and offer greater opportunity for communities to participate in their development. With this in mind, the examination went on to benchmark the e-learning systems which existing portals are based on and examine them against the knowledge transfer and capacity building requirements they set.

5 The e-learning platform

Table 1 illustrates the results of this benchmarking exercise, presenting the average percentage scores of tools provided by 67 commercial e-learning platforms and compares these against the industry standard (Web CT) & European Dynamics' OSS eOWL system. This benchmarking exercise has in turn produced an OSS (Open Source Standards) approach to e-Learning, where the exercise is driven by a small e and a capital 'L'. This has opened up the opportunity to get beyond the tendency for city learning portals to merely provide links to resources held elsewhere and provided the means to customise an e-Learning platform capable of meeting the particular knowledge transfer requirements of the IntelCities CoP.

Table 1

Results of the e-Learning Platform Benchmarking Exercise.

Source: Deakin et.al (2004)

Learner tools	Commercial platforms [1]	WebCT [2]	IntelCities platform [2]
Communication Tools	57%	71%	86%
Learning Tools	62%	60%	60%
Learner Involvement Tools	64%	75%	100%
Administration Tools	79%	75%	100%
Course Delivery Tools	72%	80%	100%
Course Design	56%	83%	83%
Hardware/Software	70%	80%	63%
Pricing/Licensing	80%	40%	100%

Notes

[1] Indicates average percentage of learner tools covered by the 67 commercial e-Learning platforms surveyed.

[2] Highlights the percentage of functionality of individual learning tool covered by services available on WebCT and European Dynamics' OSS (e-OWL) platform

5.1 The Learning Management System

The Learning Management System (LMS) developed for such purposes lies at the centre of the platform. This management system provides the common ground between course tutors, trainers and learners, a virtual space where they can co-operate with one another by sharing experiences and offering personal and confidential advice on the available courses, content and communication tools. It is designed as a set of modules in which tutors can create content, administer the resulting course and create assessments for learners, while learners are able to work with that related material. The services offered by the LMS are underpinned by a set of repositories holding information on personal data of registered members, learner's profiles, material available to support the structured course of studies and other unstructured data also available to learners.

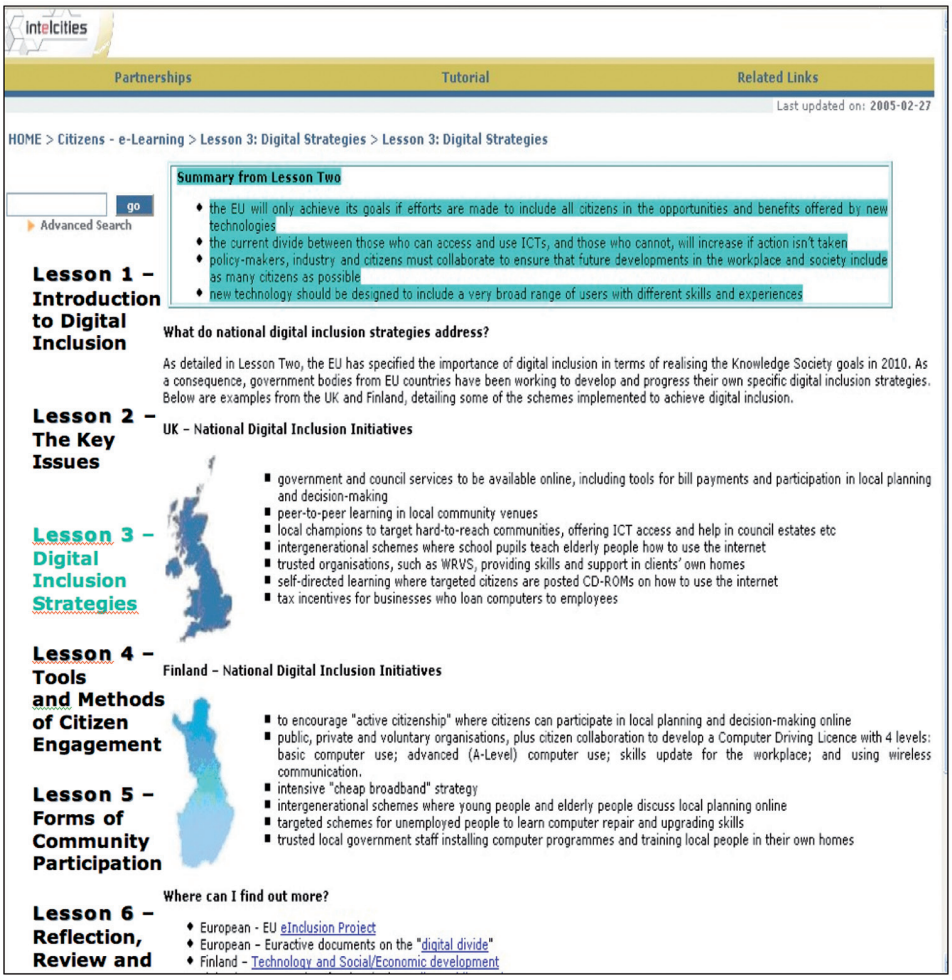

Figure 2

Sample of learning material for the Level 1 (lesson 3) eCitizenship course

Source: http://elrn.eurodyn.com/edos/elearning/welcome.do

The system architecture rests on three levels, each supported by a dedicated administrator: the platform administrator, the administrator, and the course coordinators, tutors and trainers. Here the administrator is responsible for managing the directory of members registered to a course (this provides the interface between the course provider and the learner), whilst the tutor/trainer will be the course content creator, and the coordinator is responsible for distributing the course(s) to the learner and the services supporting the relating studies. This is supported by core services that provide the learning content, communication, collaboration, assessment and administration of the IntelCities courses (i.e. the learning materials, skill packages and training exercises used for developing socially-inclusive and participatory urban regeneration programmes) which are available to the CoP (see Figure 2).

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5.2 The e-learning materials and courses

The e-learning materials are made up of three IntelCities courses. The first short course is aimed at members of the public with an interest in becoming more involved in civic life via the use of new technologies. The second course targets administrators within the public sector: those responsible for meeting citizens' expectations, in terms of access to electronically-enhanced eGov services. The third is aimed at policy-makers and strategists within city administrations who want to make their cities leading examples of the digitally-inclusive knowledge society. Together, these three courses make up the CoPs eCitizenship module. Under this heading, the course materials tackle the same core concepts: digital inclusion; citizens' expectations and the means by which cities can meet the needs of their e-ready citizens, whilst enabling access for those currently excluded from the knowledge management systems and digital technologies underlying the public's use of online services. The pitch and tone vary accordingly across the suite of materials, yet each progresses the learner towards an understanding of the tools and methods currently available for cities to use to engage citizens as members of an online community.

Whilst the short course on digital inclusion provides as set of 'taster' sessions on citizens' engagement with digital technologies, no prior experience of ICTs is needed as a prerequisite for the learning. It is designed to be open to everyone and provide universal access as a bottom line for the learning experiences to follow. Level 2 is targeted at citizens with different levels of experiential learning and, therefore, abilities. Those collaborating on the development of learning materials for Levels 2 have developed three representative e-service users, each with different levels of familiarity with ICTs. The novice user is characterised as a citizen with little experience in using computers or the internet, but an interest in learning how to find information and pay bills online. The semi-skilled, or intermediate level user is a citizen with regular access to a computer and average to-good ICT skills. At this level of ICT ability, the citizen is interested in locating detailed, up to- date information online and in submitting comments and feedback to the City. The advanced user has frequent access to ICTs and is highly skilled and confident in their ability to interact using the internet. This user wants maximum benefit from new technologies and is keen to interact with the City via services such as online debates and e-petitions.

These three characterisations serve to elicit the relationship between citizens' ICT skills and competencies and the e-services they expect their cities to provide. Figure 3 summarises this relationship. The left-hand column details the expectations of novice ICT users, the challenges these represent and action cities can take in response to them. With little access to ICTs, such as home PCs or 3G mobile phones, the novice ICT user has little confidence in the e-services under development and the potential benefits they offer. In terms of their priorities, citizens at this level prioritise the accessibility of new online services: can they locate them easily. The challenge cities are faced with is that of meeting these very basic requirements without alienating those which have higher skill levels.

As Figure 3 opposite indicates, citizens with minimal ICT skills are unable to make use of cutting-edge, interactive technologies. Digitally-excluded citizens, often amongst the most socially deprived, risk being further for the reason they lack the skills to progress in the workplace and are not members of the online communities, where citizens and their cities consult with one another and meet to deliberate on issues of public concern. By investing in community-based training initiatives and online user support, cities ensure that citizens with little-or-no-ICT experience are offered the chance to develop their skills, be included and participate in more complex inter-active online activities.

Figure 3 identifies citizens at the lowest skill level as seeking engagement at an informational level. Citizens who have progressed beyond basic ICT skills are

referred to as seeking engagement at a transactional level. The semi-skilled, or intermediate level, user has better access to ICTs than the novice and is already comfortable accessing basic information and making bill payments online. It also identifies the intermediate user's expectations: for up to-date information of a high quality and the seamless transition between different online services and websites.

information	transaction	consultation	
• accessible • reliable • efficient • quick • user-friendly • engaging • minimum user effort	• up-to-date • seamless • responsive • comprehensive • high quality	• intuitive • personalised • self-service • inter operable • increased transparency & accountability • democratic engagement • active citizenship	**what citizens expect**
• encouraging to new users • citizen-friendly language • must be easy to use • secure and private • accessible by all • citizens can develop their ICT skills	• meeting set response times • maintaining continuity • introducing electronic case handling • interactive services at appropriate technical levels	• cost-effective/cutting edge technology • citizens as customers • encouraging citizens to engage as an online community • empowering citizens to inprove the quality of online services	**the challenges facing cities**
• enable access from a range of devices • personalised information • life-cycle approach • clear security and privacy statements • training and support available • online and in community venues	• thematic entry points • news/update pages • content management systems • evaluated pilot projects • large scale e-case handling • choice of feedback mechanisms	• procuring technology based on performance requirements • participating in international networks • publicly-available benchmarking results providing resources to maximise deliberation	**how cities can respond to these challenges**

Figure 3

Citizens' skills and competencies

Source: Campbell and Deakin (2005)

As with the novice user, the user at this level requires services that are pitched at the appropriate skill level, again presenting the city with the challenge of meeting the needs of a diverse society. At this 'transactional' level, citizens are interested in establishing online communication with the City and, in order to engage these users and encourage repeated use of these services, cities are required to respond within set times. Electronic case handling is listed in Figure 3 as one method of managing the information flow and building citizens' trust in e-services, as are content management systems to ensure continuity across a range of web pages and services.

Citizens with advanced ICT skills and regular access pose an addition set of challenges to their cities, given their expectations of personalised and intuitive services like those offered in e-commerce. However, citizens at this level of ability are also able to make use of the more complex technologies cities can offer to encourage online consultative and deliberative participation. By engaging increasing numbers of citizens in online dialogue, city administrations harness the knowledge and experiences of local people in order to improve the quality of services they provide.

The Level 3 set of lessons examines the skill bases and competencies of a user who has just such abilities, who expects their city to provide personalised and intuitive services and to make use of the more complex technologies cities can offer to encourage online consultation and deliberative participation. Level 3 provides a set of lessons on how cities can use the skills and competencies their citizens have to make use of these complex technologies and become leading examples of the IntelCities CoP. Two inter-active video lessons have also been produced to support this set of lessons.

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6 Conclusion

Made up of both open source software groups, experts and lay people, this paper has shown the IntelCities CoP as an innovation seeking virtual organisation creative in co-designing the learning needs and knowledge transfer requirements of a technological platform. Having gone on to discuss the technical solutions adopted to integrate the eGov services model with the legacy systems operated by cities involved in this enterprise, attention has turned to the SOA adopted as the business model for the eCity platform.

As has been shown, these developments are valuable because they provide the means to address the criticisms of the learning services currently available on city portals and offer the opportunity for the emerging technologies of the e-Learning platform, KMS and digital libraries, to meet the learning needs, knowledge transfer requirements and capacity building commitments of the IntelCities CoP. This it has been suggested, marks a significant step forward in the development of learning services and offers the opportunity for platforms of this type to develop as a KMS supported by digital libraries.

In view of this, the report has suggested that if the full significance of these technically-innovations is to be realised, then this integration needs to progress and requires the e-Learning platform, KM system and digital library developed for such purposes, to not only be interoperable across the IntelCities middleware, but all the eGov services which are available to citizens at the front-end. The way in which the IntelCities CoP proposed to achieve this is innovative and particularly creative because the organisation offers a strategy to consolidate the learning aspirations of city portals as eGov services that have previously remained beyond the reach of the platforms developed for such purposes. That is to say, out with the grasp of previous attempts which have been made by such organisations to be innovative in creating a knowledge-base capable of delivering the consultation and deliberation services key to all this.

7 Document information

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7.2 Critical issues addressed

The nature of communities of practice in a virtual environment, and how a CoP can operate when implement a web-based service, taking into account the user base.

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www.smartcities.info

www.epractice.eu/community/smartcities

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